The forming of environmental behavior among children through ecological education in Russia: the case of UNDPs energy efficiency educational program

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Submitted by Anna Solopova

Centre for Development and the Environment

University of Oslo

Blindern, Norway

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List of Acronyms & Abbreviations

ENSI	Energy Saving International AS
GAZPROM	The Largest Russian Gas Company
GEF	Global Environment Facility
GHG	Greenhouse Gas
ME	The Ministry of Education of the Russian Federation
NGO	Non-Governmental Organization
UNDP	United Nations Development Programme
UNFCCC	United Nations Framework Convention on Climate Change
WWF	World Wildlife Fund

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Anna Solopova

1. Introduction

The planet does not need more successful people.
But it does desperately need more peacemakers,
healers, restorers, storytellers, and lovers of every
kind.

David W. Orr (2004)

In recent years, environmental education has become one of the prioritized directions in the educational sphere in many developed countries. Most likely it is an effective instrument of the education of public ecological consciousness, leading to an understanding of ecological problems and the necessity of solving them, and to a newly inspired search of possible perspectives of how to solve them.

Taking into consideration current environmental problems in Russia connected with consumption and the exhaustion of natural resources, I propose that environmental studies, the upgrade of the level of ecological knowledge among people, and the formation of pro-environmental behavior are very important for the sustainable development of the country.

1.1. Research questions and aim of the research

The aim of this research is to achieve an understanding and explanation of the effect of UNDPs energy efficiency educational program on the forming of environmental behavior among children in Russia, and to find out the potentials embedded in environmental education. The study is divided into two

parts. *Part One* (first research question) is based mainly on empirical research, and *Part Two* (second research question) is more theoretical.

The two interrelated research questions are as follows:

1. To what extent is the UNDP energy efficiency educational program maintained in Russian schools one and a half year after the project's completion?
2. What are the possibilities for and barriers to forming pro-environmental behaviour among children through ecological education in Russia? What analytical approaches are suitable to understand the process of ecological education and the forming of pro-environmental behaviour?

These research questions are closely linked: The first one provides the data about the existence of an energy saving program at project schools. It also explores how the received knowledge about energy saving is transferred to the children's homes as actual implementation of energy efficiency measures. The second research question, in its turn, explains the possibilities for and barriers to forming pro-environmental behaviour. These explanations are based on obtained findings and the existing theoretical basis.

1.2. Rationale

My research aims to understand the long-term effectiveness of environmental educational projects, particularly on energy saving, implemented by international organisations in Russia. I have chosen the example of the UNDP/GEF project "Cost-Effective Energy Efficiency Measures in the Russian Educational Sector" as the basis for my investigations.

The present study is important for two reasons. First, Russia is the world's third largest GHG emitter in absolute terms (UNFCCC, 2006) and greenhouse gases are the main cause of human-induced climate change, which results in global warming and weather chaos worldwide, and in a sharp increase in the number and scale of natural disasters. The Arctic tundra

permafrost area, which occupies about 60% of the total area of Russia, will become the region most affected by global warming (WWF, 2008). So there is undoubtedly need to reduce GHG emissions, and to develop measures to effectively save energy in the country. Second, even though the Russian Federation holds the world's largest natural gas reserves, they are projected to last only another half a century (Russia Energy Data, 2007). Accordingly, it is of the utmost importance to use energy resources more efficiently, as well as to meet domestic demands and maintain gas exports in the longer term.

The UNDP project on energy efficiency was developed and introduced in Russian schools more than five years ago, and it was successfully completed in summer 2006. Between summer 2004 and the project's completion, I was involved in the implementation of this project as a Program Assistant of the Environmental Unit UNDP Russian CO. The project consisted of an educational program on energy efficiency in secondary schools, targeting class 8, and principally addressing awareness barriers at school and household levels. The overall goal was, according to a Project Document (2002), to achieve "energy efficiency educational program established at secondary schools, increased public awareness, and motivation to initiate implementation of practical energy efficiency measures". My research seeks to examine if the educational program still exists in the project pilot schools of Russia. Or has the program slowly decayed after UNDP's project completion? If so, what factors can be determined to account for this decay?

Furthermore, it is relevant to investigate the motivations and attitudes of schoolchildren to carry out energy efficiency measures at schools and their homes. The possibilities of the forming of pro-environmental behaviour among children through ecological education will be analysed on the basis of adopted theories. Finally, I investigate what the barriers are for its formation, and what may promote its development in Russia. This data may be used by energy saving educational program authors for the future development of the present program, or in a process of creation of new environment educational programs.

1.3. Theoretical basis

This research investigates how children translate the knowledge they have acquired through the educational program into energy efficiency measures in their own lives. The question of the possibilities of forming *pro-environmental behavior* through education is greatly linked to the adopted theoretical basis. This study gives great attention to the pro-environmental behavior theory proposed by Anya Kollmuss and Julian Agyman (2002) and the action competence approach offered by Jensen and Schnack (1997).

Kollmuss and Agyeman (2002) have proposed that *environmental knowledge* is a subcategory of a more comprehensive *environmental attitude*, and that it is *emotional involvement* which shapes an environmental attitude and awareness. They also distinguished between internal factors and external factors that co-constitute pro-environmental behaviour. Internal factors range from environmental knowledge to attitudes, emotions, motivation, responsibilities, and priorities. External factors are, for example, social, economic, institutional, and cultural factors. Their model is based on the principle that "[…] the biggest positive influence on pro-environmental behavior is achieved when internal and external factors act synergistically" (Kollmuss & Agyeman, 2002: 257). The main barrier, according to their model, is old behaviour patterns which previous studies have often overlooked. This theory gives me the basis for identifying and analyzing the promoting factors and barriers to developing pro-environmental behaviour among those children who participated in the energy efficiency educational program.

Also the study of environmental education by Jensen & Schnack (1997) is weighty in the current study, as it is essential to know how much the energy saving educational program follows the action-oriented education. The researchers propose to use the "action competence approach" in environmental education as a necessary alternative to the traditional, science-oriented approach. They criticize the latter for leading to knowledge about

environmental problems, but not to building up students' abilities to act with reference to environmental concern. An action-oriented environmental education, they say, "could be defined as education which implies that working towards developing environmental actions is an essential element […]. There is a need for a form of teaching from which pupils acquire the courage, commitment and desire to get involved in the social interests concerning global problems" (Jensen & Schnack, 1997: 472, 478).

According to the researchers, there are four important components or skills of the action competence concept: (1) knowledge/insight (what the problems are, how they arise, how to solve them); (2) commitment (promoting the children's motivation, commitment and drive); (3) visions (developing children's ideas, dreams and perceptions about their and their society's future life); and (4) action experience (taking concrete environmental action during teaching at school). On the basis of these components I investigate which of the offered skills is developed among children during the energy efficiency education program in Russia, and how much the program follows the action competence approach.

The combination of these two presented theories is appropriate in this study, as the pro-environmental behaviour model helps to define barriers and promoting factors for behaviour forming, and the action competence approach, in its turn, can be used to disclose the advantages and disadvantages of the energy efficiency educational program that influence the forming of these factors and barriers.

1.4. Outline of the thesis

The following chapter is historically oriented. It discusses the development of the energy saving program in the Russian educational sector. Its main purpose is to present the premises and reasons for developing energy efficiency programs in Russia. But it also sheds a light on the energy saving program of the Ministry of Education with its main activities and received program results.

Finally, the chapter describes the UNDP energy efficiency educational program, which is the basis for the present research.

The third chapter discusses methodology. The thesis builds its arguments on existing literature, lesson observation, informal interviews, and text analysis. It combines qualitative research with a quantitative component analysis. The quantitative analysis provided necessary statistical data, and the qualitative approach facilitated an in-depth analysis of the phenomenon.

The subsequent theory chapter is about the history of the development of modern pro-environmental behavior theory. Particular attention is given to the mentioned theory of Kollmuss and Agyman (2002) and the action competence approach offered by Jensen and Schnack (1997), which are a main theoretical basis for the present research. The narration begins with presenting main types of environmentally significant behaviors according to Stern (2000) and the underlying factors of forming of pro-environmental behavior on the basis of theories of Borden and Francis (1978), Geller (1995), Stern (2000), and others. This chapter also presents a few influential pro-environmental behavior models (Hines, 1987; Grob, 1999; Blake, 1999 etc.) based on factors that determine the forming of behavior.

The fifth chapter presents the findings which were obtained during the fieldwork, and discuss these in the light of the theoretical basis. It evaluates the statistical data about the presence or absence of the educational program at project schools of four project regions (Petrozavodsk, Archangelsk, Tver and Murmansk). These findings reflect the situation of the educational program one and a half year after the UNDP's project completion, which at that time financed the implementation of the program at project schools. The chapter also considers the description of an in-depth investigation which was carried out at Tverskoy lyceum, and treats this investigation in relation to the theories.

The final chapter discusses the findings and conclusions. It also offers recommendations to the present energy saving educational program.

2. Background

This chapter provides background information for the present study.

First, I review the information about the premises and reasons for developing an energy saving program in the educational sector in Russia. The chapter thus provides a context for energy saving programs in Russia in general, and for the present study in particular. The barriers to energy efficiency in the educational sector are very much the same as in other sectors of the Russian society. They constitute knowledge-based, financial, institutional, and technical barriers. Because of the high potential of the education sector for promoting awareness of energy issues, it was convenient for the Russian government and international organisations to give special attention to the sector. The aim was to implement school demonstration projects as well as to utilise the sector's potential for changing people's behaviour.

Second, the chapter provides information about the project "Energy Saving" of the Ministry of Education, which was the initial source for developing energy efficiency project at the UNDP's Russian country office. This part of the chapter considers the fundamental directions of improving the efficiency of the energy use in educational institutions, according to this programme.

And finally, in the last part of the chapter, a presentation of UNDP energy efficiency educational program, which is the basis for my present research, is shown and the main results of the program, received one and a half year ago, is marked.

2.1. Premises for the development of an energy saving program in the educational sector in Russia

The Russian Federation holds the world's largest natural gas reserves, the second largest coal reserves, and the eighth largest oil reserves (Russia Energy Data, 2007). Today, the Russian Federation is still the world's third largest GHG emitter in absolute terms (UNFCCC, 2006). Among Russia's total GHG emissions, energy and transport-related carbon dioxide (CO2) emissions constitute the major share with 84 per cent (4th Russian National Communication, 2004). These greenhouse gases are the main cause of human-made climate change, which results in global warming. However, there is a vast potential for energy efficiency and GHG reductions in the fields of energy generation and energy use. As Russia's gas reserves are projected to last only another fifty years, a more efficient domestic use of energy resources is necessary to meet domestic demand, and maintain gas exports in the longer term.

During the 1990s, energy bills became a heavy burden on local municipal budgets (UNDP project document, 2001). However, the implementation of profitable energy efficiency measures in Russian municipalities was still very rare. In 1992, the responsibility for general education was decentralised and transferred to the regions (Law on Education, 1992). Primary and secondary schools were owned and operated by the municipalities, whose budgets have to finance school construction, maintenance, and utilities. And expenditures for education were covered either by the regional budget, or the municipal budget. The federal government became responsible for post-secondary educational institutions, including most vocational schools. Most regions benefited from federal transfers to finance general education. However, these transfers have fallen both in absolute terms and in relation to what the regions themselves spend. During the 1990s, public spending on education fell in real terms at a rate of 6 percent per year. So decentralisation was carried out without a commensurate transfer of resources

and regions were often left with substantial responsibilities, but without any financial means to maintain and operate the education system satisfactorily.

Moreover problems with decreased funding were aggravated by problems related to budgeting. School principals had no autonomy in selecting budgetary expenditure priorities. There was still little motive for schools to economise on areas of spending, such as energy use, since schools were unlikely to benefit from the savings.

Russia spends twice as much energy per square meter, and more than twice as much per student for the heating and lighting of schools, as do Western systems in comparable climates (4th Russian National Communication, 2004). The high demand for heating and lighting is primarily a result of inefficient building designs, including mechanical, control systems and low-quality construction. The cost per student is also high because Russian schools provide far more space per student, and because of the inefficient space utilisation.

Despite the fact that the cost of the energy still remains far below the international market prices, energy prices have already increased essentially since the collapse of the Soviet Union. The high energy costs may not allow allocating adequate funding to offer sufficient levels of teacher's salaries and to provide students with better teaching materials and facilities. Furthermore, most likely energy prices will be increased considerably in the coming years, as low domestic prices make it hard to invest in new gas field development, new gas pipeline laying and existing capacity reconstruction, thus, arresting progress in the industry. According to the latest Gazprom report (2008) "Russia's existing gas prices do not cover production, transportation and sale costs. That is why, in November 2006, the Russian Federation Government took the decision to gradually increase regulated gas prices till 2010: to 15% in 2007, 25% in 2008, 20% in 2009 and 28% in 2010. By 2011 sales profitability is planned to reach a European market level (including transmission costs and customs duties)" (Figure 1).

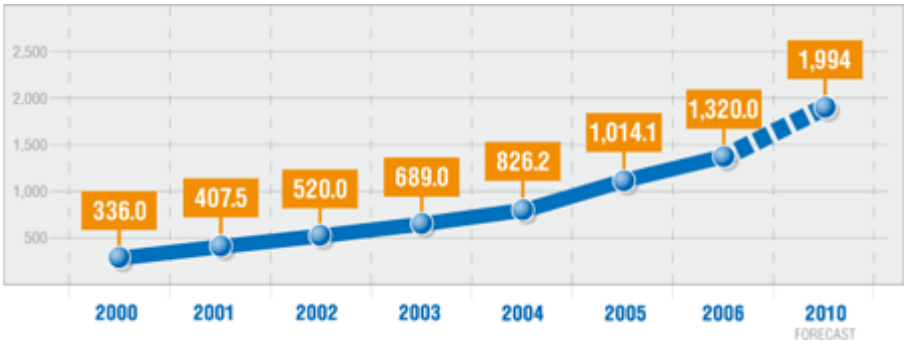

Figure 1. Average domestic gas price (net of VAT) and projected price changes under Russian Energy Strategy (GAZPROM report, 2008)

In general, the barriers to energy efficiency in the educational sector are very much the same as in other sectors of the Russian society. They constitute knowledge-based, financial, institutional, and technical barriers. In addition to the mentioned institutional and financial obstacles, another main barrier for energy saving is the inadequate awareness and knowledge of the possibilities for energy saving. The wholesale energy supply and the inherited habits from times of low energy prices resulted in disregard of saving of heat, hot water and electricity in institutional buildings. It is aggravated by the fact that these commodities are normally paid according to established standards rather than according to actual use.

Practical examples of successfully completed low-cost energy efficiency projects in the Russian education sector are few and far between (UNDP project document, 2001). Energy efficiency projects in any of the municipal sectors require efficient promotion and backstopping by strong institutions in order to overcome the barriers to their practical implementation. And the potential project developers may face large uncertainties about the best technical solutions, estimated savings etc. without "best practice" guidelines and demonstration programs.

The financial resources for energy efficiency measures in the educational sector are limited. The development of a potentially profitable

project often stops due to the lack of capital. High interest rates and an undeveloped lending and mortgage market are main obstacles.

Energy efficiency is not a core task of any existing administrative entity. The unclear administrative responsibilities are a great challenge for project developers. Preferably, different levels and sectors of administration, district heating companies, NGOs, education, research and expert organisations, and other stakeholders would need to establish cross-sectoral co-operation and strategic partnerships in order to work efficiently for the common goal of energy saving.

Because of the high potential of the education sector for promoting awareness of energy issues, it is convenient for the policy makers to give special attention to the sector in order to implement both school demonstration projects, and to utilise the sector's potential for changing people's behaviour.

2.2. The Ministry of Education's Project "Energy Saving"

The Energy Strategy of Russia, outlined in a Presidential Decree in May 1995, established energy efficiency among the highest energy policy priorities with the aim of setting the country on an energy-efficient development path. The new strategy encourages participation of all levels and sectors of the society. The strategy was followed by the Law on Energy Saving in April 1996, which established the legal, regulatory and institutional basis for a federal energy efficiency program.

In 1999, in accordance with the resolution of the Board of the Ministry of Education of the Russian Federation, the complex program of energy savings and optimal use in educational institutions was created. In the framework of this program was approved and co-financed the UNDP/GEF project "Cost Effective Energy Efficiency Measures in Russian Educational Sector", which is the basis for the present study.

Order #575 of the Ministry of Education of Russia, dated 05.03.1999, outlined the following main activities to fulfill the “Energy Saving” Project (ME Project, in what follows):

1. Development of the regulatory-legislative base for energy saving in educational institutions and regulatory methodical materials ensuring the completion of the ME Project.
2. Developing standard account and report forms of educational institutions on the energy use.
3. Developing methods and recommendations on the proper use of energy resources in educational institutions on the basis of the experience available and accumulated during the ME Project realization.
4. Conducting energy studies in educational institutions, determining the energy-saving potential in educational institutions when introducing the energy-saving measures, technologies, and equipment.
5. Developing and producing efficient technical and commercial account and checking means as well as control systems for reducing energy consumption with the use of the production facilities of the Ministry of Education in Russia.
6. Estimating potential and using the commercially available means to check and control energy-consumption in organizations subordinate to the Ministry of Education of Russia, using the centralized funds.
7. Organizing and operating energy-saving centers, and certification; servicing the energy consumption accounting, checking, and control systems.
8. Organizing systems for training and skill improvement of the operational, engineering, and technical personnel of educational institutions in the energy saving field.
9. Promoting advantages in the energy-saving field, prodiving information, and advertising.

The ME Project realization envisaged extensive use of the research and technical experience accumulated in the higher educational institutions and research organizations in Russia.

2.3. Main achievements of the “Energy Saving” Project

The work scope for realizing the energy-efficient measures and the financing structure were determined by the trilateral agreements on the joint activities in the energy-saving field among the Ministry of Education of the Russian Federation, the Ministry of Energy, and the regional administrations.

In accordance with the agreement, the parties undertook to coordinate their efforts in the field of realization of the joint project. They had to control the fulfillment of the complex scientific, research, development and production activities in the educational institutions aimed at reducing community charges due to introduction of complex organizational and technical measures to improve the energy use efficiency.

To fulfill the ME Project, the Ministry of Education of Russia instructed 41 universities to pursue the unified technical policy in the field of energy saving in the regional educational institutions. These higher educational institutions were supposed not only to fulfill the ME Project at its facilities, but also perform monitoring of this activity (consultations and methodical assistance) in other educational institutions.

The number of energy-saving measures was assumed to be priority measures. The energy studies should be carried out and on their basis the development of the feasibility studies for realizing the energy-saving measures in educational institutions. Also there were expansion and realization of organizational and technical measures for reducing the heat losses through the building envelopes, optimization of the energy flows in educational institutions and augmented control over the fuel, electric power, and heat consumption, including purchase of the energy-saving devices and equipment. Moreover it was important to design and mount operations to install devices for the energy and energy-carrier consumption account and monitoring and automatic systems for regulating the lighting, ventilation, heating, and hot water supply equipment. It was also necessary to produce and develop the

high-efficient energy-saving equipment and to fulfill the monitoring of the energy saving measures in educational institutions. To implement the energy-saving measures the systematic and additional training of specialists should be done.

The methodical unity and coordination of actions were reached through the program, information, and methodical support as well as creating regional infrastructures ensuring unified energy-saving policy with the use of modern technologies and staff training on the energy-efficiency issues.

In 1999 – 2005, 1090 educational institutions of this country (higher and secondary special educational institutions) took part in realization of the energy-saving measures within the framework of the “Energy Saving” Project of the Ministry of Education of the Russian Federation.

The first step in realizing the ME Project was related to complex energy study (energy audit) of educational institutions. The energy audit allowed to analyze efficiency of using the energy resources and water, determine the potential of their saving, and develop the necessary energy-saving measures. The energy audit in educational institutions was performed with direct participation of the regional energy-saving centers of the basic higher educational institutions. The results of the energy studies were used for developing the energy-saving measures for the energy carries types recommended for the use by the higher educational institutions.

Thus the ME project "Energy Saving" consisted of activities mostly connected with a technical reconstruction of educational buildings. And accordingly with a training of specialists in order to conduct energy audit and develop the set of energy efficiency measures for any educational institution. At the same time the education of students and schoolchildren on energy saving was not included in the ME project objectives, and this educational component was realized on the basis of the UNDP energy efficiency project, as presented further.

2.4. The UNDP/GEF project "Cost-effective energy efficiency measures in the Russian Educational Sector"

In summer 2006, the UNDP/GEF project "Cost Effective Energy Efficiency Measures in Russian Educational Sector" was completed after it had been conducted for four years. Since summer 2004 until the project completion, I was involved in the implementation of this project as Program Assistant of the Environmental Unit UNDP Russian CO.

The project "Cost-effective energy efficiency measures in the Russian Educational Sector" was initiated by the United Nations Development Program (UNDP) based on results of previous projects within the framework of a Russian-Scandinavian cooperation in order to improve the public awareness and initiate development at the school level (including the Norwegian program SPARE). The general financing sponsor of the UNDP project was the Global Environment Facility (GEF). The UNDP Project was co-financed by the Ministry of Education of the Russian Federation in the framework of national program "Energy Saving", regional authorities of the pilot territories as well as foreign participants: Ministry of Foreign Affairs of Norway and Nordic Environment Finance Corporation (NEFCO). The participation of several Federal Ministries was essential in order to ensure that the UNDP Project development was in line with federal priorities and standards, and to ensure the effective dissemination of results and lessons learned.

The main purpose of the UNDP Project was to contribute to reducing greenhouse gas emissions by improving the effectiveness of using various energy types in Russian educational institutions. The short-term aim of the UNDP Project was to develop replicated models of introducing cost-effective measures of improving the energy use effectiveness in both municipal secondary schools and building of federal educational institutions.

The UNDP Project involved three sets of problems. The first set was aimed at attaining results in increasing the public awareness and generation of

the school-level initiatives by way of development and distribution of the educational program for the secondary schools related to the energy efficiency and environmental protection. The second set was concentrated on providing viability of the cost-effective measures in energy efficiency in schools and universities of the pilot regions by creating effective revolving financial mechanisms in each participating region and financing of the demonstration projects. The third set was aimed at replicating successful energy-saving models in the Russian Federation regions and retraining of professors of the University energy-efficiency centers for replicating the skills, knowledge, and experience. It was expected that owing to the involvement of educational sector, the UNDP Project would provide an impact beyond concrete energy measures in the pilot educational facilities and result in broader application of energy efficient behaviour both by individuals and institutions.

The North-West region of Russia (Arkhangelsk, Murmansk, and Tver provinces, and the Republic of Karelia) was chosen as the pilot regions. Long-term and effective cooperation and experience exchange in the energy-efficiency field was developed between Scandinavian partners (Norway and Finland companies) and Russia Northwest regional authorities, non-governmental companies, and businesses. The Norwegian company ENSI, which is a member of the Norwegian Energy-Efficiency Group, was the developer and active distributor of their experience in Russia.

Further in my research I consider only the educational component of the UNDP project.

2.5. The energy efficiency education and public awareness program

The overall goal of the educational component of the UNDP Project was an "energy efficiency educational program established at secondary schools, increased public awareness, and motivation to initiate implementation of practical energy efficiency measures" (Project Document, 2002). The program

should prepare the ground for wide acceptance and application of the energy efficiency measures in Russian schools. The energy efficiency educational program is based on extensive research, program development and piloting in Northwest Russia, as part of the larger European environmental education program SPARE. This largely co-funded outcome supported the development of innovations related to energy saving at the school level in the teaching and learning process.

The program was developed and approved by the Federal Ministry of Education as well as by Departments of Education of Arkhangelsk City, Murmansk Oblast, the Republic of Karelia, the City of Petrozavodsk, and the City of Tver. The program was adopted as an optional course for schoolchildren of the 8th grade, and it was integrated into the regular profile courses (physics, geography, chemistry, biology, etc.). The basic set of training materials that was prepared included a textbook for schoolchildren, a guidebook for teachers, and a working notebook for students. Training materials were tested in:

- Arkhangelsk: 16 pilot schools
- Murmansk: 9 pilot schools
- The Republic of Karelia: 21 pilot schools
- Tver: 16 pilot schools

The educational program involved teachers, pupils, and their families in theoretical, practical, and artistic activities. These activities aimed at an increased understanding and public participation in energy efficiency measures. The program encouraged practical activities in simple energy efficiency measures and other relevant student project work, including inviting experts for lessons and performing simple investigations. Moreover, the educational program was available for all schools in the pilot regions and for other regions of Russia through a distribution of textbooks and through the

Internet. The training of teachers for energy-saving teaching was organised at university faculties of teacher re-training.

In April 2006, the national experts' evaluation was carried out, and the level of influence of the educational program and actual savings in project pilot schools were investigated (Kosivcov, 2006). The majority of schools had the energy efficiency educational program as optional course. Only a minority of schools integrated this program into the obligatory courses of physics, chemistry, geography, etc. The experts found that there was a high level of comprehension of the importance of the energy efficiency measures among children. However, the level of information about this educational program among children' parents was very low. What was also carried out in all project pilot schools were energy efficiency measures such as the installation of an energy consumption counter, the maintenance of an optimal light regime, etc.

As a result, this educational component was evaluated very positively by independent experts (Tremeer, 2006), and a sufficient amount of project pilot schools was involved in the implementation of this program. The main independent expert, Grant Ballard-Tremeer (2006: 8), gave the following assessment of the educational part of the UNDP project:

> … Energy saving education programme in schools has brought significant benefits in terms of real energy savings in the school and at homes of children (with savings on average of 7% from training in the pilot schools). This impact is hugely significant from the point of view of long-term valuing of natural resources, and promises to be highly cost effective in the middle to long term. Effective school education programmes on energy saving can have an impact in decision-making levels in schools and municipalities.

So the *immediate* results just after the completion of the UNDP project were very positive. But what is about the program's long-term effectiveness and its further sustainable development? The present research explores this question.

3. Methodology

3.1. Collecting information according to the research questions

In my study I combine qualitative research with a quantitative component analysis. The quantitative analysis helps obtain the statistical data, while the qualitative approach is used for an in-depth analysis of the phenomenon. Let me start with considering the first research question:

To what extent is the UNDP energy efficiency educational program maintained in Russian schools one and a half year after the project's completion?

To start answering this question, I obtained data from participating schools about the current presence or absence of the energy efficiency educational program in their school. The survey was made by collecting data through phone interviews. There were considered 62 schools in the project regions Tver, Petrozavodsk, Arkhangelsk, and Murmansk, which were mentioned in the project's final report (Kosivcov, 2006). If the program had been rejected and finished, I asked why it was finished, and for what reasons.

Subsequently, I selected one of the project schools that still have the educational program, Tverskoy lyceum, for a deeper, qualitative analysis. There I carried out semistructured interviews with children, teacher, etc., took photographs, and collected supporting documents. During the investigation there were two focus groups at Tverskoy lyceum:

- schoolchildren and their parents,
- the principle and schoolteachers.

According to the first project question (mentioned above), it was essential to know how the educational program works outside of schools at children's homes, and what parents think about this program, how they estimate the importance of a practical implementation of energy efficiency

measures at their homes. Also the in-depth interviews with principle and teacher gave practical information (how many hours per week, how many children, what age, etc.) and opinions about the significance of the program for their school.

The second project question is *What are the possibilities for and barriers to forming pro-environmental behaviour among children through ecological education in Russia? What analytical approaches are suitable to understand the process of ecological education and the forming of pro-environmental behaviour?* First I carried out in-depth interviews with schoolchildren about the advantages and disadvantages of the conducted educational program from their point of view, why children like or dislike the program, how the children perceive the program, and if it changes what they usually did before. I also estimated the children's comprehension of the environmental importance of energy efficiency measures, and what their motives are to carry out energy efficiency measures at schools and their homes. Moreover I compared their views and knowledge about environmental issues and activities with those children who did not participate in the program. And naturally it was necessary to ask the children about how they perceive: What changes occurred in the children's everyday life and their behavior (at school, at home, etc.) after the conducted educational program? In addition I made observations of children's behavior during lessons. The collected data – supported by the theoretical base on this question – gave me the opportunity to analyze the possibilities of forming pro-environmental behavior among children through ecological education in Russia. To what extent can their attitudes and behavior be attributed to the effects of the program? Moreover, the findings were used to analyse how the educational program satisfied action-oriented education.

The theoretical model on the forming of pro-environmental behavior provided by Kollmuss and Agyeman (2002) is one of the main analytical approaches for my research. This model was applied to investigate the internal and external factors which influence environmental behavior for the conditions

of Russia and this particular educational program. The external social, economic, institutional and cultural factors were approached through interviews (with children, the principal, and parents), UNDP project documentation, and other written sources. And the internal factors (environmental knowledge, attitudes, motivation and priorities) were defined through the interviews with schoolchildren as well as through essays about this educational program which I asked them to write.

Also I partly use the theory provided by Chawla (1999) about the influence of nature surroundings on environmental behavior by asking children to write in the essays about their experience with and attitude to nature.

The "action competence approach" offered by Jensen & Schnack (1997) helps to understand how much the present energy efficiency educational program followed action-oriented education. Does this program develop the skills in children which are described in the "action competence approach" for commendable environmental education? And if so, how much? Four types of skills are investigated through a careful analysis of educational methods, observations in class during the lessons, interviews with schoolchildren, and their essays.

3.2. Choosing field and method

In this case study I consider qualitative methods because they are central for understanding program realities, as well as for drawing general conclusion about the forming of environmental behavior among children. Ethnography is frequently used as a general term for qualitative research. A useful and sufficient definition of ethnography was offered by Hammersley:

> … Ethnography is a form of social research which relies on the first-hand knowledge of social processes gathered *in situ* by the researcher through

> participation and observation, questioning the people involved, and collection relevant documents. (Hammersley 1984**)**

Ethnographic research uses data collected from different perspectives and by different methods, with observation being one of the main methods. The methods of data collection used in ethnography, such as interviewing and observation, are common to other designs, but ethnographic analysis is not. The ongoing analysis which takes place as fieldwork progresses leads to the development of propositions or hypotheses, and to the testing of these hypothesized relationships through further data gathering and analysis, in the search for supporting or disconfirming evidence for the developed theory.

The main field work of my research was implemented from the 2nd December 2007 until 31st January 2008 in Russia. As I had been involved in implementation of the UNDP energy efficiency project as Project Assistant I had some advantages during the present research such as unlimited access to the UNDP project documentation, availability of information about the project pilot schools, native language etc. But at the same time it is essential to mention some limitations of obtained data through interviews due to my past involvement in the UNDP project, what was known among the project school's responsible persons. Though, during my investigations I mentioned that today I carry out independent research as a student of Master's Program at University of Oslo. The field work consisted of two parts, where one is the quantitative research and another one is the qualitative research, the main part of the fieldwork. I conducted interviews, observations, made the field notes and audio-visual materials, and carefully studied educational program materials.

According to Creswell (1998) there are seven main data collection activities:

1. *location site/individuals*
2. *gaining access and making rapport*

3. *purposefully sampling*
4. *collecting data*
5. *recording information*
6. *resolving field issue*
7. *storing data*

The *location site* of the project is the case of the educational program of the UNDP/GEF project "Cost Effective Energy Efficiency Measures in Russian Educational Sector", and 62 project pilot schools accordingly. For in-depth analysis Tverskoy lyceum was chosen, which is situated in the Tver project pilot region.

Individuals involved in the data collection were the lyceum's principal, teachers, schoolchildren and their parents.

For *gaining access* for in-depth analysis to Tverskoy lyceum I made a participation form/rapport (Appendix 1) where I mentioned the central purpose of study, the procedures of collecting data, the expected benefits to the participants, and the right to voluntarily withdraw from the study at any time. This form was signed by the principal of the school, Meister I.V.

Following the typology of *purposeful sampling* strategies in qualitative inquiry, provided by Miles and Huberman (1994), in my case study I use "maximum variations" as a strategy to represent different cases to fully display present researched subject and situation. For the part of quantitative analysis I did not use sampling at all, as I researched all pilot project schools that participated in this educational program. But some of them were not accessible, so I obtained data at 47 of 62 project schools.

For my interviews and observations there were the following participants in the mentioned Tverskoy lyceum:

1. The principal of Tverskoy lyceum, Meister I.V.

2. The teachers of the energy efficiency program, Skorlotov A.G. and Meister N.V.

3. Twenty schoolchildren: 9 children who participate in this program now (it is everybody who participates in this program at Tverskoy lyceum today), 3 children who had the program 1-2 years ago, and 8 children who have never participated in this program. There are 14 children from the 9^{th} grade, 2 children from the 10^{th} grade, and 4 children from the 11^{th} grade.

4. Two parents whose children participate now and participated in this program before.

For the quantitative analysis I made the survey (Appendix 2) by *collecting data* through phone interviews.

For qualitative research I used all four basic types of collecting information described by Creswell (1998). There were the interviews, where all of them were one-on-one semistructured interviews with a majority of open-ended questions. The observations were carried out, where I gathered fieldnotes by conducting observation, like when I observed the school's lessons. The documents, as all project educational component materials and the schoolchildren's essays, which I asked the children to write, were collected. Also I gathered some audio-visual materials, like photographs from the lesson observation.

I *recorded* and *stored* received data by using observation fieldnotes, interview protocols (Appendix 3), and a photo camera.

3.3. The Constant Comparative Method (CCM) for interview analysis

For systematization of the interviews' analysis process, and to increase the traceability and verification of the analyses, I used the Constant Comparative

Method (CCM), offered by Glaser and Strauss (1967) and further practically described and developed in her study by Hennie Boeije (2002). This approach argues that comparison is one of the dominant principals of the analysis process in qualitative research, because it increases the internal validity of findings.

This method of comparing and contrasting is used for practically all intellectual tasks during the analysis: forming categories, establishing the boundaries of the categories, summarizing the content of each category, etc. I try to describe and conceptualise the variety that exists within the studied subject. The text that resulted from the transcription of the interviews provides the input for the analysis process. It is used to make sense of the data, and to construct perspectives of the groups being studied. The analysis consists of two activities, namely fragmenting and connecting (Dey, 1993). Both strands are necessary and keep each other in equilibrium. The process of fragmenting lifts the coded pieces out of the context of the interview as a whole.

From my empirical study derived a four-step analysis procedure, which works as follows:

1. Comparison within a single schoolchildren interview.
2. Comparison between interviews within the same group of children.
3. Comparison of interviews from different groups of children.
4. Comparison between interviews of children and their teacher/principal/parents.

At the start of my interviews analysis, the comparison was conducted within one interview. In the process of open coding, every passage of the interview was studied to determine what exactly has been said, and to label each passage with an adequate code. By comparing different parts of the interview, the consistency of the interview as a whole was examined. Important questions regarding comparison in this first phase of analysis are (Boeije, 2002):

- Which codes are used to label the categories in this particular interview? What characteristics do fragments with the same code have in common?
- What is the core message of this interviewee?
- Is the storyline consistent? Are there any expressions that are contradictory? How are all the fragments related?

The comparison in the next step was between interviews within the same group, which means persons who share the same experience, in my case the schoolchildren who participated before or currently participate in the energy efficiency educational program. It was important to compare fragments from different interviews that I had interpreted as dealing with the same theme and that had been given the same code. By comparing, it became evident that some interviews can be grouped together because they are similar with regard to certain criteria. In many cases, some codes were combined with other codes and formed a pattern. The analysis revealed that interviewees coped with this educational program in very different ways. To find out why, to identify the conditions that apply and the consequences that result, it was necessary to compare interviews as a whole.

In this phase, the following questions are of importance (Boeije, 2002):

- Is interviewee A talking about the same category as B? What do both interviews tell us about the category?
- What are the similarities and differences between interviews A, B, C…?
- What are the criteria underlying this comparison?
- What combinations of codes/concepts occur? What interpretations exist for this?

This step results in an extension of the amount of codes, until no more codes are needed to cover the various relevant themes contained in the interviews. The relevant parts of the interviews are those that say something about the research question. Combinations of codes were formed. These combinations form profiles and types. In my case, for example, it is a typology

of schoolchildren (which are participating in the educational program) who deals with this educational program in a particular way.

In the third step, interviews from different groups were compared with regard to the experience of a specific phenomenon. In my study, this was conducted by comparing children's interviews who did not take the program at all with ones who have had it in the past or have it now. The interviews with the children who did not participate in the educational program were conducted in the same way as the interviews with the participating children, with mostly the same set of questions. The interviews with this group of children were used to arrive at a better understanding of the influence of the educational program on participating children. These interviews completed the picture already obtained and enriched the information on the first group, i.e., the participating schoolchildren.

The important questions posed in this step were (Boeije, 2002):

- What does group 1 say about certain themes and what does group 2 say about the same themes?
- Which themes appear in one group but not in the other group and vice versa?
- Why do both groups view issues similarly or differently?
- What nuances, additional details and new information does the other group supply about the group of our interest?

The last step was to compare the schoolchildren's interviews with the interviews of their parents. The comparison produced insight into similarities and differences, agreement or disagreement on relevant themes. The aim of this was to find information about the educational program from all perspectives.

4. Theory

In my research I investigate the application of energy efficiency measures at children's everyday behaviors (schools, homes, etc.) owing to the conducted educational program. The question of the possibilities to form *pro-environmental behavior* through education greatly depends on the adopted theoretical basis.

In a few words this chapter is about the history of the development of modern pro-environmental behavior theory. Particularly high attention is given to the theory of Kollmuss and Agyman (2002), and to an action competence approach offered by Jensen and Schnack (1997), which are a main theoretical basis for the present research. The narration begins with the presentation of main types of environmentally significant behaviors according to Stern (2000). Further, the underlying factors of forming of pro-environmental behavior are illustrated on the basis of theories of Borden and Francis (1978), Geller (1995), Stern (2000), etc. A few influential pro-environmental behavior models (Hines, 1987; Grob, 1999; Blake, 1999 etc.) based on factors which determine the forming of behavior are presented further.

In the article *Mind the gap: why people act environmentally and what are the barriers to pro-environmental behavior* (Anya Kollmuss & Julian Agyeman, 2002), the authors discuss the necessary components for forming pro-environmental behavior and propose their own model of pro-environmental behavior. According to their theory it is important to know which barriers to pro-environmental behavior are recognised in compliance with my present research, and which internal and external factors may influence pro-environmental behavior in the conditions of Russia and this particular educational program.

The "action competence approach" offered by Jensen & Schnack (1997) is used for understanding how much the present energy efficiency

educational program follows the action oriented education, and if this program develops the skills in children which are necessary for commendable environmental education. Thus four offered types of skills are presented, and the importance of action-oriented knowledge, proposed by Jensen (2002), is considered.

4.1. Main types of environmentally significant behavior

Throughout human history, environmental impact has largely been a by-product of human desires for physical comfort, mobility, relief from labor, enjoyment, power, status, and so forth, and of the organizations and technology humanity has created to meet these desires. Only relatively recently has environmental protection become an important consideration in human decision-making that forms the concept of pro-environmental behavior in the field of environmental psychology, which is described in the following definition:

> … By "pro-environmental behavior" we simply mean behavior that consciously seeks to minimize the negative impact of one's actions on the natural and built world. (Kollmuss & Agyeman, 2002: 240)

There were defined several distinct types of environmentally significant behavior by Stern (2000), and different combinations of causal factors determine the different types. The first is *environmental activism*, which means the active involvement in environmental organizations and demonstrations. Committed environmental activism is a major focus of research on social movement participation, for example the study of McAdam (2001). Further it is necessary to mention the *nonactivist behaviors in the public sphere*. It differs from the active type as the kind of environmental citizenship which just supports and accepts the public policies by a willingness to pay higher taxes for environment protection etc. An important feature of public-sphere behaviors, including activism, is that environmental concerns are within awareness and may therefore be influential (Stern, 2000).

Consumer researchers and psychologists have focused mainly on *behaviors in the private sphere*: the purchase, use, and disposal of personal and household products that have environmental impact. It is useful to subdivide these according to the type of decision they involve: the purchase of major household goods and services that are environmentally significant in their impact (e.g., automobiles, energy for the home, recreational travel), the use and maintenance of environmentally important goods (e.g., home heating and cooling systems), household waste disposal, and "green" consumerism (purchasing practices that consider the environmental impact of production, for example, purchasing recycled products and organically grown foods). Private-sphere behaviors are unlikely public-sphere environmentalism is that have direct environmental consequences. The environmental impact of any individual's personal behavior is small, but it has environmentally significant impact in the aggregate, when many people independently do the same things. Particularly, this type of behavior is considered in my present research, as the investigation of children's private behavior is the main subject of the study.

Individuals may affect the environment through other behaviors, such as influencing the actions of organizations to which they belong. For example, engineers may design manufactured products in more or less environmentally benign ways; bankers and developers may use or ignore environmental criteria in their decision, etc. Such behaviors can have great environmental impact because organizational actions are a large direct source of many environmental problems.

According to Stern (2000), this distinction among behavioral types is not only conceptually coherent but statistically reliable and psychologically meaningful. For instance, a factor analysis of the behavioral items in the 1993 General Social Survey revealed a three-factor solution (Dietz et al., 1998). One factor included four private-sector household behaviors (e.g., buying organic products, sorting household waste for recycling); a second included two environmental citizenship behaviors (signing a petition and belonging to an environmental group); the third included three items indicating willingness

to make personal financial sacrifices for environmental goals, which assess policy support. A different pattern of social-psychological and social-demographic predictors was associated with each of the behavioral types, and even the two citizenship behaviors had quite different sets of predictors.

4.2. The underlying factors influencing people's concerns and behavior about the environment

For the last 30 years, researchers have examined the underlying factors that influence people's behavior and concerns about the environment and environmental issues.

One notable approach was that taken by Dunlap and his colleagues in the New Environmental Paradigm (NEP; Dunlap et al., 2000). Rather than measuring specific attitudes, Dunlap and his colleagues developed a series of items to assess an "ecological worldview." In examining the core message of the environmental movement during the 1970s, Dunlap and Van Liere noted that there was more than just attitudes and concerns about environmental issues — the movement was challenging fundamental views about the relationship between people and nature. The NEP scale was designed to measure this new emerging worldview, which included: beliefs about the limits to growth, humanity's ability to upset the balance of nature, and humanity's right to rule over nature.

Interesting investigations were also made by Borden and Francis (1978) in their research which was designed to identify personality factors that underlie concern for environmental problems. High and low environmental-concern individuals were given the California Psychological Inventory and were found to differ significantly on many subscales. A comparison of two groups shows that the environmentally concerned individuals seemed to be better adjusted socially as well as being more responsible, conscientious persons. Thus, there emerges a picture of persons who are alert to current

issues, and at the same time, through socially acceptable, cooperative efforts, attempt to take individually responsible actions towards their solution.

The comparison of results of groups of different genders showed that environmentally concerned females appeared to be much more extraverted than environmentally indifferent females or environmentally concerned males. For women, and especially those with strong social motivations, the environmental forum may be viewed as a place to exercise and develop interpersonal and leadership skills (ibid). The newness of the environmental forum may be seen as providing unfettered opportunities for obtaining recognition for one's talents and initiative.

The motivation among males appears to be somewhat different. Borden and Francis (1978) note that males high in environmental concern have less tendency to extraversion than environmentally concerned women or unconcerned men. It may be that the male who is concerned about environmental problems is oriented more toward the issues themselves than toward opportunities for social recognition. Alternatively, however, extraverted males, who tend to be low in environmental concern, may exercise social mastery and control (and thereby satisfy their needs for social recognition) in more traditionally male-oriented and/or dominated causes. According to the scientists the conclusion of research is:

> … The results of this study affirm the notion that psychological individual differences do underlie an awareness and concern about current environmental issues. In part, this may reflect the fact that less environmentally concerned persons' indifference may stem from a generally more selfish, competitive orientation towards the world. Or, on the other hand, that people who are more environmentally concerned have resolved more of their personal concerns and consequently are better able to devote their energies to larger, less personal matters (Borden & Francis, 1978).

Several other researchers developed their hypothesis on theories of altruism, arguing that altruism is needed or at least supports pro-environmental behavior. Schwartz's (1977) theory assumes that altruistic behavior increases when a person becomes aware of other people's suffering and at the same time feels a responsibility of alleviating this suffering. More recently Geller (1995) has developed an "actively caring" model to predict the propensity of an individual to actively care for the environment or for another person. Personal factors that influence one's propensity to "actively care" include self-esteem, belongingness, self-efficacy, personal control, and optimism (see Figure 2). People with a high propensity to actively care are more apt to emit personal behavior-change intervention programs for environmental preservation.

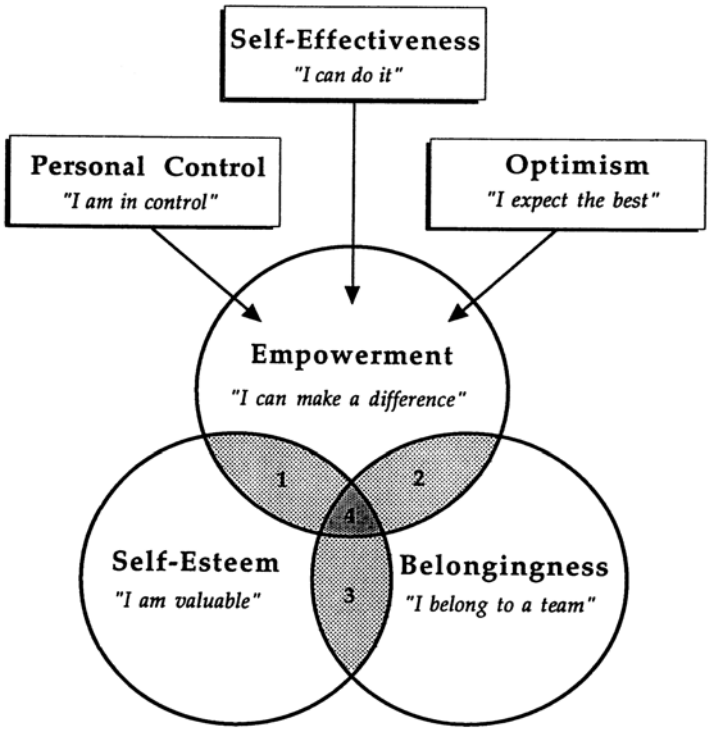

Figure 2. The five personal states or expectancies presumed to influence propensity to "actively care" (Geller, 1995)

Moreover, Geller (1995) argues:

> … The more positive and long-term approaches for changing human behavior and attitudes for environment protection are only feasible for large-scale application if increasing numbers of people actively care enough to implement these techniques. Thus it is critical to establish the situations and contingencies that increase readiness to actively care (Geller, 1995: 194)

Stern and his colleagues have developed a Value-Belief-Norm (VBN) model to explain environmental attitudes and behaviors (Stern, 2000). The VBN theory postulates a causal chain of variables that leads to behavior: values, worldview, awareness of adverse consequences for valued objects, perceived ability to reduce the threat, and personal norms for pro-environmental behavior. In essence, the theory predicts that an individual's values interact with specific perceptions of a given situation (perceived adverse consequences to a valued object, and perceived ability to do something about it) to yield behavior.

Within the VBN theory, values provide the source of concern for environmental issues and for pro-environmental behavior. Stern identified three sets of values (ibid) associated with environmental attitudes, which he labeled egoistic, altruistic, and biospheric. *Egoistic* values are focused on oneself and self-oriented goals (e.g. social power, wealth, personal success); *altruistic* values focus on other people (e.g. family, community, humanity, friends); *biospheric* values focus on the well-being of living things (e.g. plants, animals, trees). Conceptually, each of these sets of values can lead to attitudes of concern for environmental issues, and ultimately to behavior when activated.

There is considerable evidence for the existence of value-based environmental concerns, according to the implemented researches by Schultz (2001). For instance, he asked participants in 14 countries to rate their concern for the harm caused by environmental problems to a number of objects. Analyses showed a clear structure, corresponding to egoistic (me, my lifestyle, my health, and my future), altruistic (people in my community, all

people, children, future generations), and biospheric (plants, marine life, birds, animals) concerns. The structure of these concerns was largely consistent across the 14 countries sampled.

4.3. The development of the modern pro-environmental behavior models

The oldest models of pro-environmental behavior were based on a linear progression of environmental knowledge leading to an environmental attitude, which lead to pro-environmental behavior (Anya Kollmuss & Julian Agyeman, 2002). These models from the early 1970s were soon heavily criticized, as research showed that increases in knowledge and perception did not lead to pro-environmental behavior. Changing behavior is a more difficult and complicated process.

Many researchers have tried to explain the gap between attitude and behavior. The *theory of planned action* offered by Ajzen and Fishbein (1980) argues that attitudes do not determine behavior directly, rather they influence behavioral intentions which in turn shape our actions. Intentions are not only influenced by attitudes but also by social/normative pressure. Thus "the ultimate determinants for any behavior are the behavioral beliefs concerning its consequences and normative beliefs concerning the prescriptions of others" (Ajzen & Fishbein, 1980: 239).

Further on the basis of the theory of planned action several scientists published their *models of responsible environmental behavior* (Hines, 1987) and marked variables associated with responsible pro-environmental behavior. First of all, there is the *knowledge of issues.* That means the person has to be familiar with environmental problems and their causes. Secondly, the *knowledge of action strategies* is necessary, as the person has to know how he/she has to act to lower his or her impact on the environmental problem. Further, it is the *locus of controls* which represents an individual's perception of whether he/she has the ability to bring about change through his/her own

behavior. People with a strong internal locus of control believe that their actions can bring about change. On the other hand, people with the external locus of control feel that their actions are insignificant, and that change can only be brought by powerful others. *Attitudes* are also are very important, as people with strong pro-environmental attitudes are more likely to engage in pro-environmental behavior. The communicated willingness (*verbal commitment*) to take action also gives some indication about the person's willingness to engage in pro-environmental behavior. Finally, the *individual sense of responsibility* is necessary, as people with a greater sense of personal responsibility are more likely to have engaged in environmentally responsible behavior.

According to Kollmuss & Agyeman (2002):

> … Although the framework by Hines (1987) was more sophisticated than Ajzen and Fishbein's (1980), the identified factors do not sufficiently explain pro-environmental behavior. The relationship between knowledge and attitudes, attitudes and intentions, and intentions and actual responsible behavior, are quite weak. There seem to be many more factors that influence pro-environmental behavior (Kollmuss & Agyman, 2002: 243-244).

The theory about necessity of emotional involvement in formation of pro-environmental behavior offered by Grob (1991) is very meaningful in this case as well. He proposed that "[…] the stronger a person's emotional reaction, the more likely that person will engage in pro-environmental behavior." (Anya Kollmuss & Julian Agyeman, 2002: 254) At the same time, emotional involvement requires a certain degree of environmental knowledge and awareness.

The model proposed by Grob (1995) consists of five components: environmental awareness, emotions, personal-philosophical values, perceived control, and environmental behavior (Fig. 3). Each component includes two or more sub-components. The *environmental awareness* component includes factual knowledge about the environment and recognition of environmental

problems. The *emotion* component includes the emotional value which the individual places on aspects of the environment and the disturbance resulting from his or her perception of the discrepancy between ideal and actual environmental conditions. The *personal-philosophical* component includes post-materialistic beliefs and readiness to adopt new attitudes (openness). The *perceived control* component involves beliefs about the efficacy of science and technology and beliefs about self-efficacy. Finally, the *behavior* component includes direct actions that impact the environment.

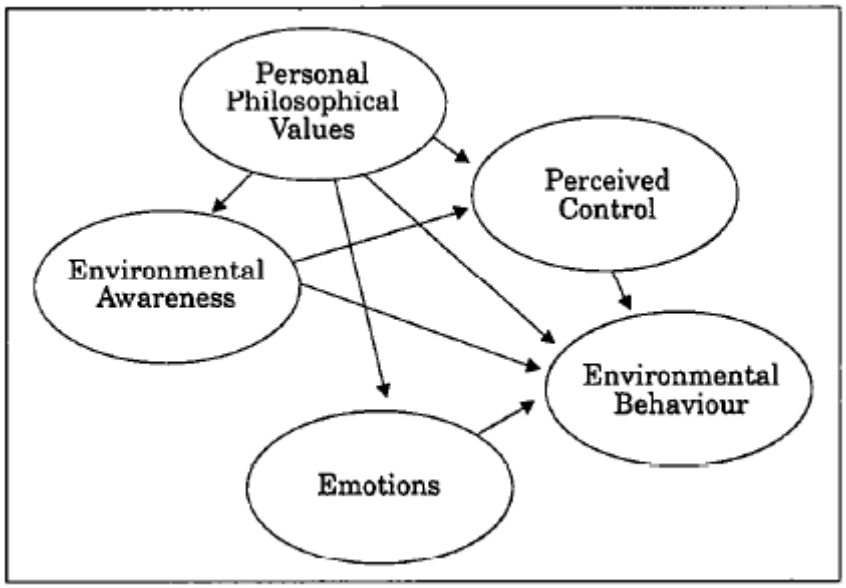

Figure 3. The model of environmental behavior by Grob (1995: 209)

However, the presented model (Grob, 1995) does not include other categories of influence (i.e. socio-economic factors, cultural factors, etc.) to gain a more comprehensive model of pro-environmental behavior.

Later the gap between attitude and behavior was considered by Blake (1999) in his theory "Value-action gap". In the baseline research, his aim was to shed light on the value-action gap by asking the respondents themselves to identify the barriers or reasons that prevented them from carrying out particular environmental actions, despite a general concern for the environment. Then he summarized or coded the responses according to particular headings. Figure 4 illustrates these responses, grouped into three

different categories of obstacles that exist between the sphere of 'concern' and that of 'action': *individuality, responsibility* and *practicality*. The responses confirm that both psychological and institutional factors affect individual action. Which factors are important in any one case will vary for different individuals, environmental actions, and social or institutional constraints.

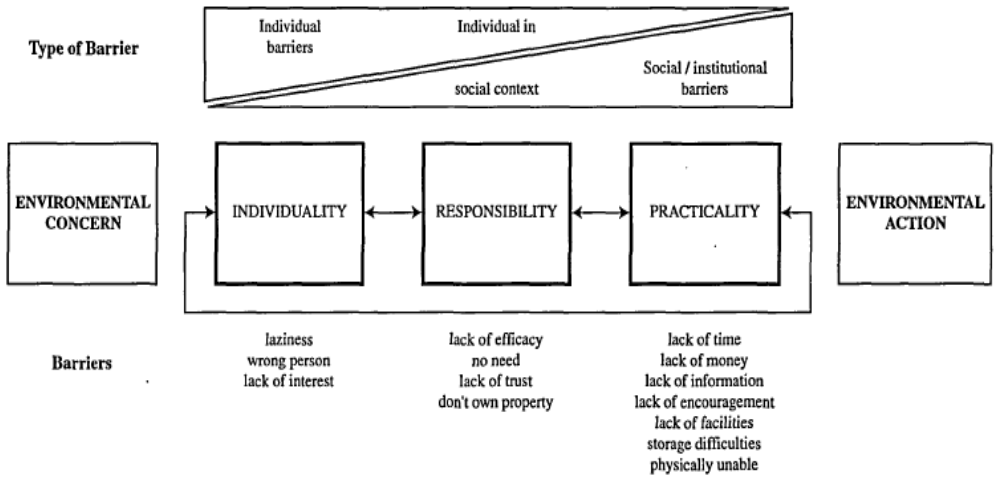

Figure 4. Barriers between environment concern and behavior by Blake (1999: 267)

According to Blake (1999), individual barriers are barriers lying within the person, having to do with attitude and temperament. He claims that these barriers are especially influential in people that do not have a strong environmental concern, and environmental concern is therefore outweighed by other conflicting attitudes.

The second set of barriers is responsibility. People who do not act pro-environmentally feel that they cannot influence the situation or should not have to take responsibility for it. Blake (1999) points out that in the particular community he is describing, a lack of trust in the institution often stops people from acting pro-environmentally—since they are suspicious of the local and national government, they are less willing to follow the prescribed actions.

The third barrier Blake defined as the social and institutional constraints that prevent people from acting pro-environmentally, regardless of

their attitudes or intentions. He lists such constraints as lack of time, lack of money, and lack of information, etc.

Although this model is sound and useful, it does not include social factors such as family influence or cultural traditions and norms.

4.4. Pro-environmental behavior theory and the model by Kollmuss & Agyeman

Consequently, as the main determining factors and a few pro-environmental behavior models were presented above, it indicates that the question of what forms pro-environmental behavior is very complex. In my research I prefer to use the recent pro-environmental behavior model (Figure 5) proposed by the researchers Anja Kollmuss and Julian Agyeman in 2002. They have proposed that environmental knowledge is a subcategory of environmental attitude, and that it is emotional involvement which shapes environmental awareness and attitude. For example, if the person has a strong feeling that he or she cannot change the situation, he or she will very likely retreat into apathy, resignation, and sarcasm. A person might stop informing himself or herself about environmental issues, stop acting pro-environmentally and focus on different aspects of life. Also they distinguished the following influential factors to pro-environmental behavior:

- demographic factors;
- internal factors (e.g. environmental knowledge, attitudes, emotions, motivation, responsibilities, and priorities);
- external factors (e.g. social, economic, institutional and cultural factors).

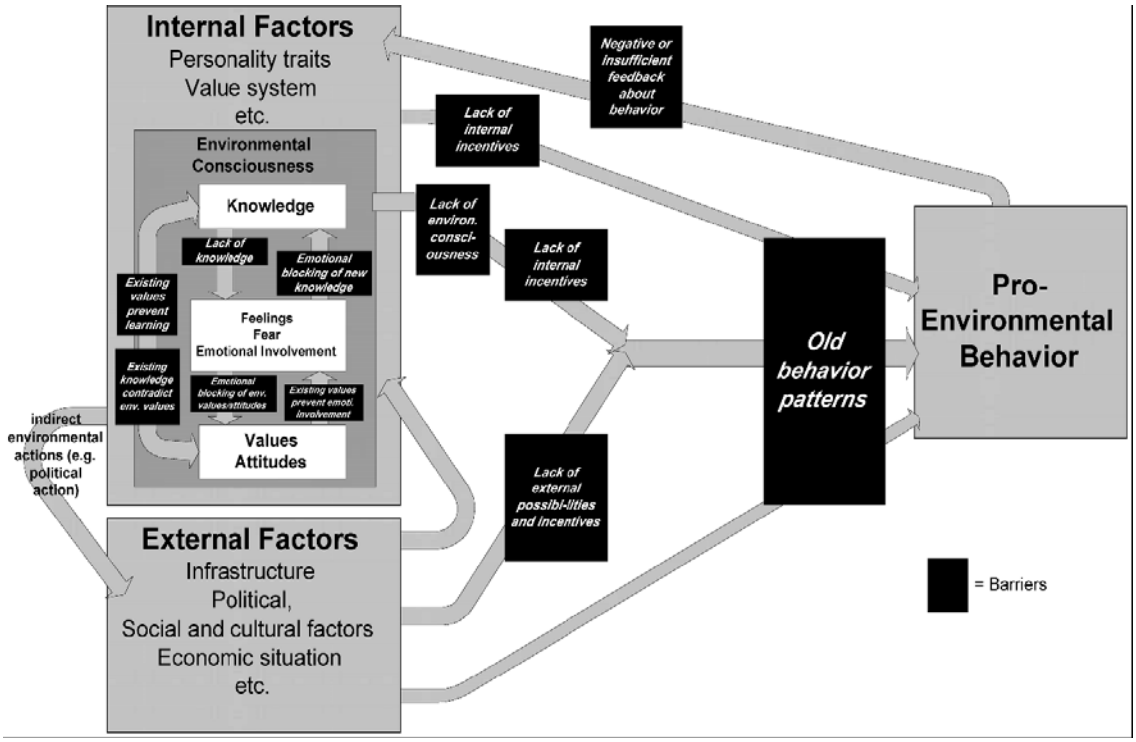

Figure 5. The model of pro-environmental behavior by Kollmuss & Agyman (2002: 257)

Further, a more detailed analysis of determinal factors is offered. According to Kollmuss and Agyeman (2002), the *demographic factors*, which influence environmental attitude and pro-environmental behavior are years of education and gender. The longer the education, the more extensive is the knowledge about environmental issues, though more education does not necessary mean increased pro-environmental behavior. If even women have less wide environmental knowledge than men, they are more emotionally involved and are more willing to change (Borden & Francis, 1978).

There are several *external factors* presented in this pro-environmental behavior model. First, there are the *institutional factors* which mean the necessity of an appropriate infrastructure for environmental action, as recycling equipment, developed system of public transportation, etc. The poorer such services are, the less likely people are to use them. The researchers argue:

> … Institutional barriers can be overcome primarily through people's actions as citizens (indirect environmental actions). Because of this, it is important to explore how environmental attitudes influence indirect environmental action. It might be true that environmental knowledge and environmental attitude have a more powerful influence on people's indirect actions than on people's direct pro-environmental behaviors. (Kollmuss & Agyeman, 2002: 249)

Secondly, it is the *economic factors* which have a strong influence on people's decisions and behavior. Economic factors are connected with social, infrastructural, and psychological factors. They are clearly important when designing new policies and strategies that are meant to influence and change people's behavior, especially in combination with other mentioned factors. The *cultural* and *social factors* also play a very important role in shaping people's behavior, and it is significant to mark that sometimes stimuli like cultural traditions or economic advantages can move people to act pro-environmentally without doing it out of environmental concern. But as Preuss (1991) argues, "[…] such unconscious pro-environmental behavior can easily be reversed or changed to a more unsustainable pattern because it is not based on some fundamental values." (Anya Kollmuss & Julian Agyeman, 2002: 250)

The *internal factors*, which provide the forming of pro-environmental behavior, primarily consist of a *motivation*, as the reason for behavior or a strong internal stimulus around which behavior is organized. According to Kollmuss and Agyman (2002), motives for behavior can be overt or hidden – conscious or unconscious. In addition, they declare that primary motives (the larger motives that let people engage in a whole set of behavior, e.g. striving to live an environmental lifestyle) could be overridden by the selective motives (the motives that influence one specific action) that form the barrier to pro-environmental behavior. For instance, the man will drive to work by car on a rainy day because it is rather for him to feel comfort (selective motives) than to be environmentally sound (primary motives).

A lot of researchers think that only a small part of pro-environmental behavior can be linked directly to *environmental knowledge* and environmental attitude. But at the same time it was confirmed that sufficient knowledge of environmental issue can contribute to forming pro-environmental behavior.

The next determinal factor are *values*, which are responsible for shaping much of people's intrinsic motivations, and the question of what shapes people's values is a complex one. According to the theory authors (Kollmuss and Agyman, 2002), one way to explore the determining factors that create environmental values is to study the life experiences that have shaped the environmental beliefs and values. For instance, the research conducted by Chawla (1999) has significant meaning in the question. He interviewed large numbers of professional environmentalists in Norway and in the USA about their experiences and the people who influenced their decisions to become environmentalists. Results showed that during childhood, the most influential were experiencey of natural areas and family; during youth age and early adulthood, education and friends were mentioned most frequently; and during adulthood, it was pro-environmental organizations. Her research is valuable in that it shows how important an emotional connection to the natural environment seems to be in fostering environmental awareness and environmental concern.

Attitudes, as values, also play an important role in determining pro-environmental behavior.

> Attitudes are defined as the enduring positive or negative feeling about some person, object, or issue. Closely related to attitudes are beliefs, which refer to the information (the knowledge) a person has about a person, object, or issue. (Newhouse, 1991, quoted in Kollmuss and Agyman, 2002: 252)

However, according to Kollmuss and Agyman (2002), environmental attitudes have a varying, often small impact on behavior. For instance, people choose the pro-environmental behaviors that demand the least cost, where cost is not strictly economic issues, but also time, effort, etc. People who care about the environment tend to engage in activities such as recycling but do not necessary engage in activities that are more costly and inconvenient such as driving or flying less.

In the theory, an *environmental awareness* is defined as knowing the impact of human behavior on the environment, and is constrained by several cognitive and emotional limitations. The cognitive ones consist of non-immediacy of many ecological problems, as most environmental degradation is not immediately tangible, which requires the translation of information about environmental damage into understandable, perceivable information. Most of the time this information will further people's intellectual understanding without making a link to emotional involvement (Preuss, 1991). The need of emotional involvement explains why the campaigns to protect the animals often receive much broader public support than more abstract issues such as climate change. Another cognitive barrier is the often very gradual, slow pace of environmental change, and human beings are very good at perceiving drastic and sudden changes but are often unable to perceive slow, incremental changes (Kollmuss and Agyman, 2002). Moreover, most environmental problems are complex and intricate, and it is difficult to comprehend such complex systems. This prevents people from a deeper understanding of the consequences of natural destruction. In general, "the cognitive limitations to understanding environmental degradation seriously compromise our emotional engagement and our willingness to act" (ibid.).

Grob (1995: 210) argued that the stronger a person's *emotional reacti*on, the more likely that person will engage in pro-environmental behavior, and emotional connection seems to be very important in shaping our beliefs, values, and attitudes towards the environment. But there are still several barriers to emotional engagement with respect to environmental issues.

As was mentioned above, the lack of knowledge about the causes and effects of ecological degradation can lead to emotional non-involvement (Preuss, 1991). Also there is a tendency to avoid information about environmental problems because they contradict or threaten some of our basic assumption of quality of life, economic prosperity, and material needs. Moreover, Kollmuss and Agyman hypothesized that even though people are experiencing an emotional reaction to environment degradation, they might still not act pro-environmentally, as they can feel fear, sadness, anger, and guilt. And further, these feelings may lead to a denial of the problem, rational distancing (e.g. the person protects herself from painful emotions), apathy, and delegation (e.g. the person refuses to accept any responsibility or blames others for environmental destruction).

The pro-environmental behavior model also consists of the notion of *locus of control*, which the researchers defined and described as:

> Locus of control represents an individual's perception of whether he or she has the ability to bring about change through his or her own behavior. People with a strong internal locus of control believe that their actions can bring about change. People with an external locus of control, on the other hand, feel that their actions are insignificant, and feel that change can only be brought about by powerful others. Such people are much less likely to act ecologically, since they feel that 'it does not make a difference anyway'. (Kollmuss and Agyman, 2002: 256)

Consequently, according to the theory, there are a lot of factors that influence people's decisions towards pro-environmental behavior. The presented model is important for my particular research, as it helps to investigate the possibilities of forming pro-environmental behavior among children through the conducted energy efficiency educational program. Which barriers are recognised for this specific case? And accordingly, what may promote the pro-environmental behavior? The answer to these questions

received after the in-depth investigation in the project school is described in the Findings chapter.

4.5. The action competence approach by Jensen and Schnack

The study of environmental education by Jensen & Schnack (1997) is essential for and weighty to the current project. In their research they propose to use the "action competence approach" in environmental education as a necessary alternative to the traditional, science-oriented approach which was criticized for leading to knowledge about environmental problems, but not to building up students' abilities to act with reference to environmental concern. The concept of 'action competence' has occupied a central position in the work of the Research Centre for Environmental and Health Education at the Royal Danish School of Educational Studies. According to the researchers, 'competence' is associated with being able, and willing, to be a qualified participant. 'Action' needs to be interpreted in relation to the whole range of distinctions concerning behavior, activities, movements, habits, and then, actions. Actions and experiences are very closely linked. Without action competence, one cannot become rich in experience, which in turn can help to qualify action competence. In general,

> …An action-oriented environmental education could be defined as education which implies that working towards developing environmental actions is an essential element […]. There is a need for a form of teaching from which pupils acquire the courage, commitment and desire to get involved in the social interests concerning global problems (Jensen & Schnack, 1997: 472, 478).

This concept supports an idea of education that is something more than academic schooling and behavior modification, which is not necessary as behavioral change could be caused by pressure from other people such as teachers, or by other influences such as advertisements.

The criteria for actions are summarized in the table shown in Fig. 6 (ibid). The horizontal dimension concerns the boundary between behavior and action, and thus the question of whether the pupils themselves decide 'to do something'. The vertical dimension concerns the difference between activity and action, and thus focuses on whether what 'is done' is addressed to a solution of the actual problem or not.

	Students pushed to do something	Students involved in deciding what to do
Activity solely as a counterweight to academic tuition		
Activity targeted at solving the problem		**ACTION**

Figure 6. Criteria for an action (Jensen & Schnack, 1997: 477)

As was mentioned in the theory, environmental actions can be grouped into two main categories: actions which directly contribute to solving environmental problems that are being worked on (direct actions), and actions whose purpose it is to influence others to do something to contribute to solving the environmental problem in question (indirect actions). In other words, indirect actions are characterised by dealing with 'people to people' relations, while direct actions refer to relations between people and their environment. Examples of direct environmental actions include the sorting of garbage, economising of water, energy consumption, etc. Examples of indirect environmental actions are the preparation and distribution of a newspaper concerning the environment, organising debates on environmental issues, etc.

According to Jensen & Schnack (1997: 481) there are four important components/skills of the action competence concept: knowledge/insight, commitment, visions, and action experience.

Knowledge and insight are connected with the schoolchildren receiving sufficient knowledge about what the problems are, how they arose, and what possibilities exist for solving the problems.

Commitment relates to promoting children's motivation, commitment, and drive, as "[…] knowledge about environmental problems cannot be transformed into action if courage and commitment are not present." (Jensen & Schnack, 1997: 482)

The next component is the developing of *visions* of how the conditions which one works with and would like to change might look in the future. So the vision component is related to the development of children's ideas, dreams and perceptions about their future lives, and their society.

The fourth component is *action experience*, which means taking concrete action during the teaching at school. This could be a direct or indirect environmental action.

On the basis of these components I'm going to investigate which of the offered skills were developed among children during the energy efficiency education program in Russia, and how much the program followed the action competence approach.

On the basis of this theory, Jensen (2002) proposed the model of action oriented knowledge, which is presented in Figure 7, and compared it with the tradition knowledge model.

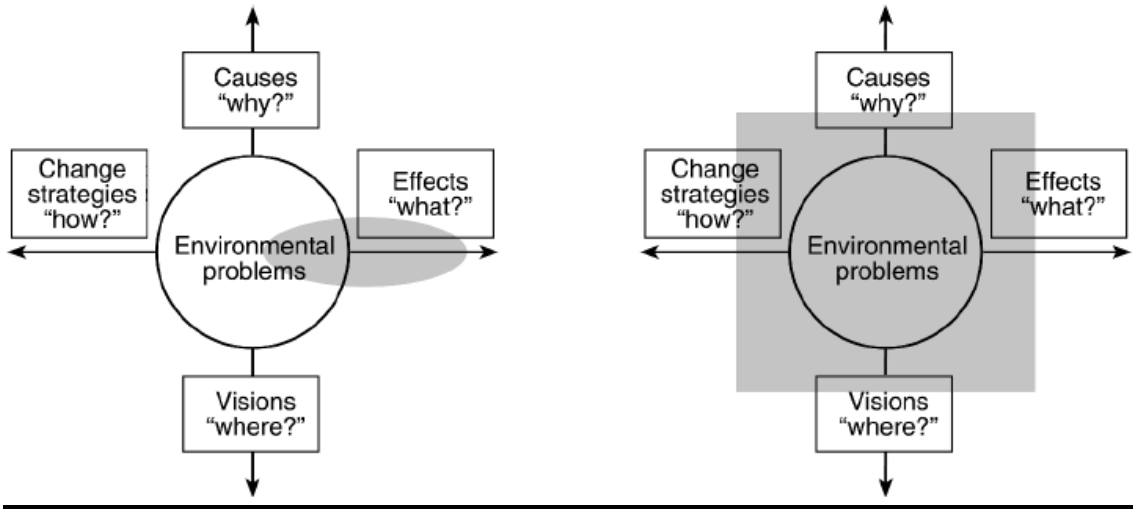

Figure 7. Landscapes for traditional (left) and action-oriented (right) knowledge. (Jensen, 2002: 332)

The researcher (2002: 329) argues that "knowledge should still be acknowledged as one – among many – important preconditions for the development of competence leading to action and behavioral adjustments in relation to the environment".

According to the presented action oriented model there are four dimensions which illustrate different perspectives on the types of knowledge through which a given environmental problem can be viewed and analyzed.

The first dimension deals with knowledge about the existence and scope of environmental problems. This knowledge is important, as it might help to rouse our concern and attention, thereby creating the starting point for a willingness to act. So, in compliance with my research, this type of knowledge can be one of the prerequisites for developing children's competence to take action and change behavior.

The next aspect deals with the 'causal' dimension, which concerns the root causes of environmental problems. This knowledge belongs mainly in the sociological, cultural, and economic spheres.

The third dimension deals with both knowledge about how to control one's own life and how to contribute to changing living conditions in society at large, and thus embraces direct as well as indirect possibilities for action.

The fourth dimension deals with the necessity of developing one's own vision. As the researcher argues:

> Seeing real possibilities for forming and developing one's dreams and ideas for the future in relation to one's own life, work, family and society, and having the support and surplus energy to realize them, is an important requisite for the motivation and ability to act and change. This dimension includes knowing about how people go about things in other cultures and other places, both near and far, as knowledge about other possibilities can be a powerful source of inspiration for developing one's own visions. (Jensen, 2002: 331)

Traditional environmental education concerns mostly the knowledge of the effects of environmental problems. This type of knowledge is not necessarily conducive to action, especially when taken in isolation. Indeed such knowledge can create "a great sense of worry, and if it is not supported by insights into causes and strategies for change, then it may contribute to weakening commitment and result in paralysis" (ibid: 331).

5. Findings

No problem can be solved from the
same consciousness that created it.
We have to learn to see the world anew.
Einstein

In this chapter I present the findings which were received during the fieldwork and their connection with the available theoretical basis, which was presented in the chapter above.

The statistical data about the presence or absence of the educational program at project schools of four project regions (Petrozavodsk, Archangelsk, Tver and Murmansk) are presented first. These findings reflect the development of the educational program one and a half years after the completion of the UNDP project, which at that time had financed the implementation of the program at project schools. Then the main reasons for a denial of the program by several schools are offered, and an analysis of regional differences is carried out.

Further findings from the in-depth investigation which was carried out at Tverskoy lyceum are described and linked to the theories. First, general information about the implementation of the energy saving educational program at the lyceum is offered. The lyceum principal and program teacher were interviewed with the purpose of understanding their comprehension and opinion about the energy saving educational program. As we shall see, their quite optimistic view that the educational program strongly influences behavior forming among the lyceum's children was not confirmed during interviews with children and their parents.

Second, the energy saving lesson observation is presented, where are marked some positive points about the lesson and also some points for

development, and these observation findings are analyzed with the help of the theoretical basis. Generally the lesson left me with a quite positive feeling afterwards, as a sincere interest of the children to the program has been seen, and a friendly atmosphere and good correlations between the teacher and the children were marked.

The lyceum children were asked to write essays with the purpose of perceiving the children's relationships with nature and their knowledge of the present environment situation. All findings are analysed with the aim to investigate what may promote and what are barriers for forming pro-environmental behaviour among these children.

Finally, a descriptive analysis of the schoolchildren's interviews is offered, which were carried out with the purpose of exploring how satisfied the children were with the energy saving education program, what they would like to add or delete, and what kind of knowledge they obtained due to the program, and if it influenced their everyday behavior. Interviews with the non-participating children in the educational program were carried out, and the findings are compared with the data of participating ones for a better understanding of the influence of the educational program.

5.1. Statistical data

The quantitative research approach is a formal, systematic process in which numerical data are used to quantify or measure phenomena and produce findings. The social survey is typically seen as the preferred instrument of social research within this tradition.

The obtaining of statistical data about the presence or absence of energy efficiency educational program at the project pilot schools today was important for answering the first research question on the development of UNDP educational program after the project completion.

There were 62 schools in Tver, Petrozavodsk, Arkhangelsk and Murmansk project regions which participated in the program one and a half years ago, according to the final report on the educational component of the UNDP project (Kosivcov, 2006), and at that time all participating schools showed very high result of realization of the project educational component.

Today the survey (Table 1) was made by collecting data through phone interviews. As was already mentioned, there were reached only 47 from 62 schools due to difficulties to reach schools by phone or a lack of contact information. At the mentioned 47 schools, I asked the principals of the schools about the presence or absence of energy efficiency educational program at the particular school today, and if the program was rejected and finished I asked the questions: Why it was finished, and for what reasons? The quantitative survey with findings is presented at Appendix 1.

As a result I received answers from 18 schools at Petrozavosk region, 12 schools from Arkhangelsk region, 7 schools from Murmansk region and 10 schools from Tver region. The following data were received:

Table 1. Presence or absence of the educational program at UNDP project schools

Region	Total number of schools	Schools which still have the program (% of the total number)	School which rejected the program (% of the total number)
Petrozavodsk	18	6 (33%)	12 (67%)
Arkhangelsk	12	5 (42%)	7 (58%)
Murmansk	7	1 (14%)	6 (86%)
Tver	10	1 (10%)	9 (90%)
Total:	**47**	**13 (28%)**	**34 (72%)**

So 72% of the project pilot schools have rejected the educational program, not having the energy saving optional course for the schoolchildren today, and only 28% of the project schools still have the energy saving course in their educational program.

I received quite a lot of different answers on my open question from the school's principals about why the program was rejected at the particular school. The following answers were dominant:

- There is no demand for this program at the school after the end of funding by the UNDP project;

- Children do not choose this subject as an optional course, there is no interest;

- The course leader stopped to teach the children because of different reasons like he/she quitted the job at the school, he/she does not have time in their schedule for this course, etc.

According to the received findings, higher rates of the presence of the energy saving program were revealed in Petrozavodsk and Archangelsk project pilot regions. This fact may be connected with different reasons.

Although the UNDP educational program was realized in Petrozavodsk region from 2003, different energy saving educational measures were introduced in this region earlier, in 1996, due to a cooperation with the international project SHPARE, which also concerns energy efficiency education. In 2004, the Ministry of Education of the region created a special committee of the UNDP program in Petrozavodsk, where the questions of adaptation of the educational program, teacher's training, and future development of the program were considered. The implementation and intermediate results of the program were fully covered by regional media (Kosivcov, 2006).

Arkhangelsk pilot region also shows quite high results in its realization of the UNDP educational program. There was created a center for teacher's training, and a lot of energy saving seminars and conferences were carried out. A manual of methodological materials for the energy saving course was published in Arkhangelsk and was distributed to every educational institution of the city. In general, the demand and necessity of the energy saving programs in the region can be explained by several reasons, such as the absence of energy sources or their high price in the region, old equipment on the energy stations with low potential, etc. (ibid.)

5.2. The energy saving educational program at Tverskoy Lyceum

The in-depth qualitative study took place in a large urban school "Tverskoy Lyceum", where the energy efficiency educational program still exists according to the conducted quantitative analysis presented above. This school is situated in a central part of Tver city, which is approximately 100 km away from Moscow. Tverskoy Lyceum is a municipal free educational institution where children have to pass admission exams to be a student. Owing to an initiative of the principal and the general academic staff, a large number of environmental projects are conducted by the schoolchildren at the lyceum. The latest projects were connected with alternative renewable energy resources (as wind stations), the accomplishment of the lyceum surroundings, garbage cans allocation, etc. The project of the wind renewable energy source was presented at the regional contest and was highly estimated by experts and took the second prized place. All characteristics and factors which influence the educational process in the lyceum will be considered further as

> … within social systems such as schools, the individual child's learning experiences are shaped by what happens in the classroom, which nested within the school, which embedded in the school district and then in the surrounding school systems, ecosystems, and political systems. At each level phenomena exhibit properties that do not exist at lower levels. (Carpa, 2005 in Stone & Barlow, 2005: 24)

At present, the energy efficiency educational program is carried out as an optional course for schoolchildren of the 8^{th}-9^{th} grades (9 children attend the program today) and partly integrated into the regular profile courses of geography and economics. A basic set of training materials is used, including a textbook for schoolchildren and a guidebook for teachers. The optional course takes 2 hours per week. The average age of the children who participate in the programme is 13-15. There are classroom discussions carried out by teachers where the schoolchildren receive information and instructions how to

save energy at the school. Energy efficiency lamps are applied at the lyceum, but they make up only 30% of the whole lighting system. The following comments to the educational program were given by the school principal during the interview:

> … Environmental education is very significant at the present time as it develops the ability of children to think and care about their neighbors, their surroundings, and their home country. The energy efficiency educational program entails the forming of the pro-environmental behavior among children, but there are some deficiencies which I'd like to mark. I suppose this program is too brief, and probably should be extended by paying attention to more different aspects of environmental education. Some chapters of the textbook contain information that is quite difficult to understand for the schoolchildren. But at the same time, this program attracts children through its novelty, reality, and the practical application of received knowledge. (Meister I.V., 2007)

The principal of the lyceum mentioned the briefness of the program and the wish to fill the program with more environmental information, and less technical one. At the lyceum she tries to apply the program to different courses, as the one-year duration of the energy saving program, according her opinion, is too short for such a topic.

The textbook "Energy Saving" (2004) and the working notebook for schoolchildren (2004) were prepared and published especially as a part of implementation of the educational component of UNDP/GEF project. It was composed by a group of scientists, the universities' academic staff, and international partners. The textbook contains a theoretical part, questions for an estimation of the comprehension of the received information, and situation exercises. There is vocabulary of terminology at the end of the textbook, which explains the meaning of specific words marked by a special sign in the text. Information which is not necessary for the children to study is marked by

particular footnotes. A large number of information resources and publications were used for the writing of the textbook.

The textbook “Energy Saving” (2004) contains the five following chapters:

1. *Energy.* This chapter consists of the information about the term energy, the physical characteristics of energy, and the importance of energy saving.
2. *Energy sources.* The second chapter describes the primary sources of energy, the renewable and nonrenewable sources of energy, and the comparison of different energy sources.
3. *Energy consumption.* This chapter contains information about the history of energy consumption, the specific features of energy consumption in Russia, the growth of energy consumption, and the energy crises.
4. *Environmental consequences of energy consumption. The* fourth chapter describes the influence of the energy production stations on the environment, global warming, and acid rain.
5. *How to save energy.* This chapter consists of information about sustainable methods of energy consumption, energy saving in transport, construction, at school, and at home.

In sum “Energy Saving” contains information concerning energy production and consumption, the environmental consequences of ineffective and irrational energy use, and the main energy efficiency measures on household and industrial levels. At the same time, the chapter about the environmental consequences is just about 20 pages. That may be difficult for a direct comprehension and the forming of a pro-environmental consciousness among

schoolchildren. This was ultimately also recognized through the children's essays and during the interviews.

The shortness of the educational program, which is offered for only one year of learning, may be one of the barriers for forming environmental behavior, since the theory of Kollmuss and Agyman (2002) marked the years of education as one of the determining factors for pro-environmental behavior and so the longer education, the more extensive is the knowledge about environmental issues.

According to the comments by the course teacher, the main goal is that this program makes children think about their own lives, their surroundings. This program consists of elements of the environmental and economic education. The teacher marked that probably the huge amount of facts in the textbook could be partly replaced by more entertaining and cognitive information. He believes that the practical knowledge received at the lyceum is transferred by children to their homes. He argued that "the educational program is a very applied program, as it consists of all necessary information for the implementation of energy efficiency measures at home, at the school, etc." However, the results of the children's interviews presented below did not confirm his assurance.

5.3. The lesson on energy saving

The lesson on energy saving was observed at the end of January, where 14 schoolchildren participated (5 boys and 9 girls). This was one of the ordinary lessons which take place every week at the same day. The purpose of observation was to estimate the learning process, the children's participation in discussion, and the overall results of the lesson.

The theme of the lesson, proposed by the teacher, was energy saving measures on a household level. This was written on the blackboard, and during the lesson the most important information also was marked there, so it

helped the schoolchildren to understand and memorize the new information better.

There had been no homework for this lesson, even though the energy-saving lesson occurs only once a week, and learning and making practical exercises at home are crucially important for this course, according the educational program methodic. As education researchers Stone & Barlow (2005) argue, “practical and manual skills are an essential aspect of experience, good thinking, and the development of the whole person.”

At the beginning of the discussion, the teacher asked the children about the sources and the types of energy which they know. The children were quite active at answering to these questions, but appeared confused with the topic of global warming. The children kept quiet and did not answer the teacher’s questions about this topic. So the teacher explained in a few words the general meaning of this phenomenon. He mainly talked about the effects of the global warming. She mentioned neither the root causes nor the change strategies to this problem, which are marked in the action-oriented education theory by Jensen (2002) as crucial points for the forming of environmental knowledge. At present, this theme is the hottest and most significant topic all around the world, but in the “Energy Saving” textbook the global warming theme is covered on six pages.

During the lesson, one of the schoolchildren gave a presentation about the invention of lamps and of energy efficiency lamps, and the schoolchildren listened with great attention. Presentations on different topics are given every lesson by the schoolchildren. It definitely improves the listening and presentation skills of the children, which may be very important for a better comprehension, of course, and for the development of personal abilities.

At the end, an open discussion about energy saving measures was carried out. The teacher asked the children to mention known energy saving measures. The children appeared active, but the lack of knowledge in this area prevented them from giving right answers, and the teacher, in turn, helped

them with hints or right answers. There were some nice interactions and some touches of humor during this discussion. A few children made the comment that it is important to develop a culture of energy saving in our society, as at the present time there is an absolutely environmentally irresponsible society in Russia. The last point may confirm the presence not only of egoistic values among children (e.g. personal wealth), but also of altruistic ones, like the care about the other people or society. According to the Value-Belief-Norm theory by Stern (2000), values can lead to attitudes of concern for environmental issues, and ultimately to behavior when activated.

Thus there could be mentioned the following *positive points about the lesson*. The lesson theme was clearly formulated, and all main points were marked on the board to help the children memorize and understand the received information better. There was marked the involving of the children in the classroom learning process in different ways, such as group discussion, presentation, etc., which can promote one's own vision of the problem, and which was mentioned as one of the main components for action-oriented environmental education. It is an important requisite for the motivation and ability to act, and to change (Jensen & Schnack, 1997).

During the lesson, the teacher was very helpful and committed. Furthermore, the schoolchildren tried to respond positively and purposefully on the proposed questions, and they willingly participated in the lesson's discussions. So there were good working relationships between the teacher and the learners.

However, there can be distinguished some *points for development*. The absence of homework for energy saving lessons limits the learning process, which requires the abundance of individual learning and practice at home (Sergeev & al., 2004). The absence of the course textbook during the lesson, which could help with any difficulties in the studied subject, was marked. There were no practical exercises or situational tasks during the lesson. All these points show that the learning process does not include

practical or situational exercises which show strategies for avoiding or reducing any particular environmental problem, and therefore there can be a problem to develop the action skills among children through this educational program (Jensen & Schnack, 1997).

5.4. The schoolchildren essay 'Nature is my home'

During my investigation at the Tverskoy lyceum I asked the schoolchildren to write an essay on the theme: 'Nature is my home'. The purposes of this assignment were to perceive the children's relationships with nature, their knowledge of the present environment situation, their ability to act pro-environmentally. I suggested them to answer the following questions in their paper:

1. What was your most remarkable experience with nature?

   Through this question I wished to find out the relationships of children with nature and the feelings during their experience. These points are important in analysis of possibilities of forming pro-environmental behaviour as they show the existence or absence of biospheric values (Stern, 2000) among children and their emotional involvement, as it seems to be very significant in shaping people beliefs, values and attitudes towards the environment (Grob, 1995; Kollmuss and Agyman, 2002).

2. How do you see our planet Earth in the future?

   This question concerns the development of children's ideas, dreams, and perceptions about their future lives and their society through education. It shows the developing of *visions* of how the conditions which one works with and would like to change might look in the future. And *vision* is a one of components of action-oriented knowledge and education (Jensen & Schnack, 1997)

3. What present environmental problems do you know?

The existing knowledge of the current global environmental situation and local problems were found out through this particular question, which may confirm sufficient knowledge in this area among children.

4. What do you think you can do to safe the environment?

The last question was proposed with a purpose to explore the children's motivation, commitment, and drive through the educational program, as "[…] knowledge about environmental problems cannot be transformed into action if courage and commitment are not present." (Jensen & Schnack, 1997: 482)

As a result I received 12 essays, which were anonymous, what was intended to make the children more free in their writing. Mainly, the children tried to answer strictly to the given questions without any additional information, and they often replied to only one of the proposed questions.

The question number one about the experience with nature was the more popular and fully lighted up at the children's essays. It was really interesting and exiting to read their stories. A majority of the schoolchildren live in an urban area with quite limited access to nature. In general, their experience with nature is connected with their summer vacation with parents or barbeque picnics. There was only one story about hiking in the woods. More than a half of the stories were with an absolutely negative impression after the nature experience, due to physical lassitude, sodden shoes, mosquitoes, etc. For instance, one of the schoolchildren wrote that during a barbeque with the parents in the forest he/she had a headache, and everything else there was quite boring. Another one narrated "when me and my friends went to the forest, my shoes were soaked and it was really cold, so I'll never forget this hike". This finding shows the lack of experience with nature during the childhood, and that may be a barrier for environmental behaviour, as particularly the experience of natural areas during childhood is a very influential factor for the developing of environmental concern and behaviour (Chawla, 1999).

A few stories were about huge garbage dumps and an uncontrolled fire in the woods seen by the children, which largely impressed them, what shows the emotional involvement. But without sufficient knowledge, commitment, etc., children might still not act pro-environmentally, as they can feel fear, sadness, anger and guilt. And further, these feelings may lead to a denial of problem, to rational distancing, apathy, and delegation (Kollmuss and Agyman, 2002).

On the second question about the future of our planet I received different answers – from the possible friendship with aliens to the wide use of organic fuel cars. At the same time there was a big hope to have the greener and cleaner environment in the future, as the children recognize that present environmental situation is a quite tragic.

At the same time the description of the present environmental problems was a difficult question for the children. They marked just a few problems as air pollution, garbage on the streets, and floods. The problem of global warming was not mentioned in the essays, even though this is one of the main environmental reasons for energy saving. Probably during their education in the lyceum, and particularly during this program, there was not paid a lot of attention to this topic.

The last question was hardly lighted up in the children's papers at all. This question was about what they can do to safe the environment, and it requires analytical thinking. I planed to investigate the ability of children to act pro-environmentally (according to the theory of action competence) and unfortunately have not received any positive feedback. The present answers were very brief, in general just about stopping litter. Just one of the answers is quite different from the others, as the student mentioned the importance of the right upbringing of her/his children in the future. These findings may primarily be explained by the lack of information and knowledge about the possibilities for action. But the findings probably also display an undeveloped internal locus of control among children, which represents an individual's perception

of whether he or she has the ability to bring about change through his or her own behavior. People with a strong internal locus of control believe that their actions can bring about change. People with an external locus of control, on the other hand, feel that their actions are insignificant, and feel that change can only be brought about by powerful others (Kollmuss and Agyman, 2002).

To sum up, the findings of the essays' analysis show that the children tried to answer strictly to the given questions without any additional information, and they often lighted up only one of the proposed questions, which may be explained by a lack of knowledge, as at least two proposed questions require a certain level of knowledge. On the other hand, it probably shows lack of interest, laziness, etc., and these individual factors are important, as according to Blake (1999), they may be determinal barriers for forming pro-environmental behaviour among children. Moreover, these individual barriers are especially influential in people that do not have a strong environmental concern, and environmental concern is therefore outweighed by other conflicting attitudes.

The question number one about the experience with nature was the most popular and fully lighted up at the children's essays. The poor adaptation ability of children in nature conditions leads to a lot of difficulties during their past experiences with nature that may be a barrier for environmental behaviour, as particular the experience of natural areas during childhood is a very influential factor for developing environmental concern and behaviour (Chawla, 1999).

The children recognize that the present environmental situation is bad, and they hope to have a greener and cleaner environment in the future. However, an insufficient knowledge of the present environmental problems among children was recognized. The children have marked the importance of responsibility and an active position of every person in relationships with the environment, but at the same time they do not have an idea of what they could

do to safe the environment, which probably defines an external locus of control among children.

5.5. Interview findings and analysis

The interviews were carried out at Tverskoy lyceum in December 2007 and January 2008. Twenty schoolchildren participated in them, as well as one course teacher, the principal of the lyceum, and two parents of the children. Twelve schoolchildren had taken the course a year ago or participate in this program today, and eight children were not involved in the program at all but study at the same school. I interviewed all 9 schoolchildren who take part in the energy saving course in Tverskoy lyceum today. The participating children are the same who were observed during the lesson on energy saving, and who wrote the essays.

The purpose of the interviews with the participating children was to explore to what extend children were satisfied with the energy saving education program, what they would like to add or delete, what kind of knowledge they obtained from the program, and if it influenced their everyday behavior.

The non-participating children were asked why they do not participate in the program, what could attract them to take part, what they know about energy saving, and which energy saving measure they implement at home. The main interest was to explore the difference in knowledge and behavior between participating and non-participating children with the aim to comprehend the influence of the energy saving program.

At the start of my interviews' analysis, a comparison was conducted within one interview. By comparing different parts of the interview, the consistency of the interview as a whole was examined, and the main points/codes were marked. As a result, summaries of each interview were made, which are presented in the tables of Appendix 4, with the answers and

comments to the main interview questions. In the first table, the interview codes of the participating schoolchildren are shown. The code PB means the participating before and P means participating now. The answers of non-participating children follow in the next table with the NP code. The codes F and M mean the female and male gender, accordingly.

Further, I compared the interviews within the same group, which consists of the responses of schoolchildren who participated before or take part in the energy efficiency educational program today. Some interviews can be grouped together because they are similar with regard to certain criteria such as obtained knowledge about the energy saving and energy efficiency measures. In my case, there were defined the following groups (Figure 8, A):

Group 1a. Children with satisfactory or good knowledge of the environmental purpose of energy saving – 3 persons;

Group 2a. Children without comprehension of the environmental purpose of energy saving, but with understanding of the economic benefits – 5 persons;

Group 3a. Children with very poor knowledge about the energy saving in general and the environmental rationale of energy efficiency measures in particular – 4 persons.

Among the non-participating children I defined the same groups with the following results: group 1b – 3 persons, group 2b – 2 persons, group 3b – 3 persons (Figure 8, B).

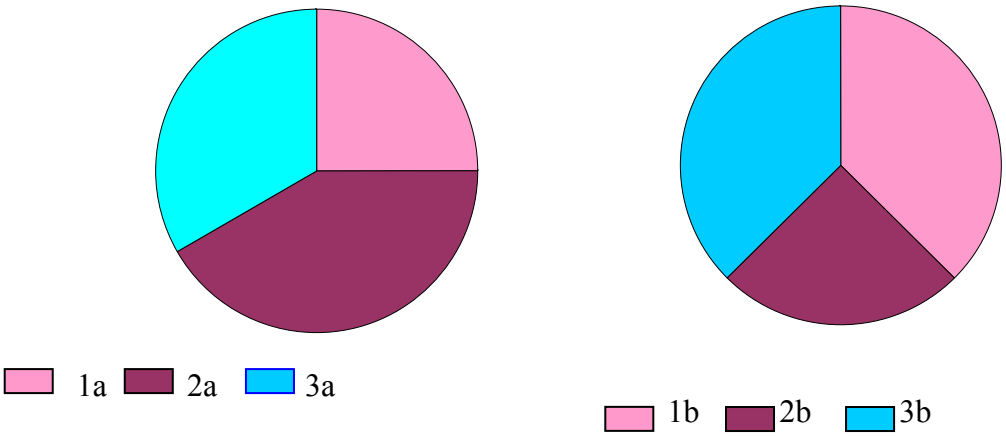

Figure 8. Definition of children groups according to the obtained knowledge among participating (A) and non-participating children (B)

In the answers to the question about what children would like to add to the present program, almost all respondents showed an interest in out-of-school lessons and activities, which could also attract other children, as has been seen from the interviews with non-participating children. About half of the participating children say that they implement energy efficiency measures at home, such as the shutting off unnecessary light and electric devices, hot water economy, the usage of energy efficiency lamps, and windows repairing before winter. The children marked the following advantages of the educational program:

- novelty of the course (67% of respondents);
- a good teacher (42%);
- the friendly atmosphere during the lessons (42%);
- the application of received knowledge in the future (33%);
- actuality and importance of the program (33%);
- possibility to carry out independent research (25%).

In the third step, I compared the interviews of the participating schoolchildren with the non-participating ones for a better understanding of the influence of the educational program. These interviews completed the picture already obtained and enriched the information.

There is a lack of information about the energy efficiency educational program at the lyceum, as almost all non-participating respondents did not know about its presence until the interviews. Some non-participating children have the same satisfactory comprehension of environmental benefits from energy saving as the participating ones (Figure 8). This knowledge goes from the family or children's strong interest in biology and geography. Some of them implement energy efficiency measures, but mainly they just mentioned shutting off the light at home, while the list of measures of participating children is more full and sufficient. There were just a few schoolchildren who emphasized their attention mainly on the economic benefits of energy saving in comparison with the participating children. This indicates that the educational program and teaching strongly underline the economic component the energy saving. After the interview two non-participating girls decided to take part at the course, and I met them already during the energy saving lesson which I observed, and this shows a potential interest of the children to the program.

In the end I compared the schoolchildren's interviews with the interviews of their parents. The aim was to receive information about the educational program from all perspectives.

According to the interviews with the two parents of participating schoolchildren who agreed to participate in the research, the educational program is significant from an economic point of view. The parents confessed that they do not think about the environmental purpose of energy saving because of lack of information about the environmental issues in their society. They mentioned only the shutting of the light and electric devices as the known energy efficiency measures. The parents are very glad that their children take part at this educational program as they believe in the application of received knowledge by their children in the future.

6. Discussion & Conclusion

It's very hard to change the values of adults, while at the same time the children are born with certain values intact – namely their sense of wonder and their affinity for nature.

Peter Buckley (2003) in Stone & Barlow (2005)

The aim of the present research was to investigate the long-term effectiveness of environmental educational projects implemented by international organisations in Russia. Moreover I defined the possibilities for and barriers to forming of pro-environmental behaviour among children through the environmental education in Russia owing to in-depth analysis of the UNDP energy efficiency educational program. In this chapter the answers to the main research questions are presented together with some concluding remarks and my personal recommendations to the educational program developed through the situation analysis.

6.1. The present state of UNDP energy efficiency educational program

The UNDP energy efficiency project was finished one and a half years ago and it was significant to know if the energy efficiency educational program still exists in the project pilot schools after project completion. The UNPD project responsible person Natalia Olofinskaya, during the recent interview, told me that she believes the educational program still exists in the project pilot schools as the program involved highly motivated teachers and have efficient methodology and teaching materials for its further sustainable development. So I have made the survey by collecting data through phone interviews and there were examined 47 schools from Tver, Petrozavodsk,

Arkhangelsk and Murmansk project regions. Only 13 schools confirmed the presence of energy efficiency educational program in their school today, what compounds only 28% from all schools participated in the UNDP project. The principals of schools, which rejected the program, explained this denial differently and even sometimes could not remember the presence of such program at their school in the past. They often mentioned a lack of demand in the program due to the stoppage of school funding from the UNDP project. Also an absence of children's interest was noticed by the principals, however during my investigation in Tverskoy lyceum the interest to the program among children have been marked.

The higher rates of presence of the energy saving program in school were revealed in Petrozavodsk and Archangelsk project pilot regions. This fact may be connected with different premises. In Petrozavodsk region before the start of realization UNDP educational program in 2003, different energy saving educational measures were introduced in 1996 due to the cooperation with international project SHPARE, which also concerns energy efficiency education. Moreover the special committee of UNDP program was created which controls the implementation of the energy efficiency educational program. So it may confirm the existence and development of different energy efficiency programs across the region today.

Arkhangelsk region also shows quite high results in realization of the UNDP educational program. There was created the center for teacher's training and a lot of energy saving seminars and conferences were carried out. The manual of methodological materials for energy saving course was published in Arkhangelsk and was distributed to every educational institution of the city.

Moreover, according to the research question, it was important to know how the received knowledge about energy saving is transferred to the children homes as implementation of energy efficiency measures. During the interview the course teacher argued that he is sure that the practical knowledge

received at the lyceum is carried by children to their homes and the educational program itself consists of all necessary components for implementation of energy saving measures by children at home and school. However, the results of children's interviews did not confirm his confidence, as only about a half of program participating children said that they implement the energy saving measures at home, what may be promoted not solely by the educational program, but also other factors, as family influence etc. The children's parents, who were interviewed, confessed that they do not think about the environmental purpose of energy saving due to lack of information about the environmental issues in their society and they mentioned only the shutting of the light and electric devices as the known and implemented energy efficiency measures.

6.2. The promoting factors and barriers to forming of pro-environmental behavior

In my research I have used the pro-environmental behavior model proposed by researchers Anja Kollmuss and Julian Agyeman in 2002, which was presented in the theory chapter. My study considers the view of many researches (Hines, 1987; Grob, 1995; Kollmuss & Agyman, 2002 etc.) that the environmental knowledge does not directly lead to pro-environmental behaviour, it is essential but not single factor which influence the forming of behaviour. So what promoting factors and barriers to forming pro-environmental behaviour among children were defined during the present study?

The *emotional involvement* which shapes environmental awareness and attitude has been noticed among the schoolchildren participated in the energy saving educational program. For instance, in their essays they showed that environmental damage which had been seen by them in different situations highly impressed and upset them. Also during the lesson children very emotionally discussed the present environment situation and irresponsibility of their society. Undoubtedly, it is very important that

emotional involvement on environmental issues exists among the children, but without sufficient knowledge, commitment etc. children might still not act pro-environmentally, as they can feel just fear or guilt. And further, these feelings may result in denial of problem and rational distancing (Kollmuss and Agyman, 2002).

Further it is essential to mark that the energy saving education program was created for a one year of learning process and probably it is not enough for a good comprehension of subject especially as it is lonely environmental course at the studied lyceum. Kollmuss and Agyman highlight the number of years of environmental education as a one of important factors which influence the forming of pro-environmental behaviour. The longer the education, the more extensive is the knowledge about environmental issues. So one year duration of the program may be a barrier for development of strong environmental concern among the children.

Study shows there are also the institutional barriers for development of people's environmental behavior in Russia, such as the lack of appropriate infrastructure for environmental action, for instance a frequent absence of energy efficient lamps in the shops and their relatively high price, the absence of recycling equipment etc. Moreover, the high demand for heating and lighting in apartment houses and educational buildings is primarily a result of inefficient building design, including mechanical and control systems, and low-quality construction. However, some institutional barriers can be overcome through people's actions as citizens (through petitions to authorities, meetings etc.), and exactly the environmental education has a powerful influence on such people's indirect environmental actions.

In general, the barriers to energy efficiency in the educational sector are very much the same as in other sectors of the Russian society. They constitute knowledge-based, social, financial, institutional, and technical barriers. In addition to the above-mentioned institutional inefficiencies, another main barrier is the inadequate awareness and knowledge about the

possibilities for energy saving. The wholesale energy supply and the inherited habits from times of low energy prices have resulted in disregard of saving of heat, hot water and electricity. It is aggravated by the fact that these commodities are normally paid according to established standards rather than according to actual use. All this factors are clearly important when designing new policies and strategies that are meant to influence and change people behavior, especially in combination with other factors. It is significant to mark that the stimuli like cultural traditions or economic advantages can move people to act pro-environmentally without doing it out of environmental concern. But "such unconscious pro-environmental behavior can easily be reversed or changed to a more unsustainable pattern because it is not based on some fundamental values" (Preuss, 1991 in Kollmuss & Agyeman, 2002: 250).

Even only a part of pro-environmental behavior can be linked directly to *environmental knowledge* and environmental attitude, but at the same time it was scientifically confirmed that sufficient knowledge of environmental issues can forward to forming of pro-environmental behavior. However, during my investigation in the lyceum, there was marked quite often insufficient knowledge about the environmental issues and particularly about the energy saving. For instance, during the energy saving lesson the children appeared quite active but the lack of knowledge prevented them from the giving of right answers to the teacher's questions about known energy saving measures and the global warming problem. In their essays the description of the present environmental problems was lighted up rather poorly. They marked just a few problems as garbage on the streets, air pollution and floods what also apparently confirms the limited knowledge in the area. The interviews with schoolchildren also detected the children's poor knowledge about the subject. Children more often marked the economic benefits from energy saving, than the environmental ones. There may be several reasons of lack of knowledge in this case, but probably the main reason is some deficiencies of this particular educational program, what will be discussed in the next part of the chapter.

The next determinal factor is a people's *values*, which are responsible for shaping much of people's intrinsic motivations, and according to Kollmuss and Agyman one of the ways to explore the determining factors that create environmental values is to study the life experience that have shaped the environmental beliefs and values. But the findings from the schoolchildren's essays show the children's lack of experience with nature during the childhood and that may be a barrier for environmental behaviour as particular the experience of natural area during the childhood is very influential factor for developing of environmental concern and behaviour (Chawla, 1999). Moreover I suppose that it is very sad that children felt mostly negative emotions during their rare experience with nature and could not enjoy the beauty and magnificence of Mother Nature. However there was noticed the existence of not solely egoistic values among children, but also the altruistic ones as children often paid attention to the society problems and showed the concern about the society future in their essays and during the interviews.

Through the children's essays and interviews I planed to recognize if the children have the internal *locus of control* on environmental issues, which represents people's belief that their actions can bring about change. Whereas people with an external locus of control, on the other hand, think that their actions are unimportant and only more powerful people can change the situation (Kollmuss & Agyman, 2002). However, for instance, in the children's essays the question about what they can do to safe the environment was lighted up very poorly, and mostly the stop of litter was mentioned. Probably these findings displays *external locus of control* on environmental issues among studied children.

Certainly, the old behavior patterns of children also may be a barrier for forming the pro-environmental behavior among program participating children, but their influence was not studied during the present research as it demands an observation of children's behavior at home and school over a long period of time.

6.3. Traditional or action-oriented education?

Through my detailed analysis of the energy saving educational program I found out how much the present energy efficiency educational program followed the action-oriented education (Jensen & Schnack, 1997) and whether this program develops the skills in children which are described for commendable environmental education, as knowledge/insight, commitment, visions and action experience.

As was already mentioned there was discovered the *insufficient knowledge* about the present environmental problems, environmental benefits from energy saving and basic energy efficiency measures among the schoolchildren during my investigation at the Tverskoy lyceum. However, the economic benefits from energy saving were fully presented during the interviews with children, what probably shows that the accent of the program is made mainly on the economic perspective and advantages of energy saving. Furthermore, the chapter about the environmental consequences of energy consumption is just about 20 from 200 pages of whole book, that maybe difficult for the direct comprehension and the forming environmental consciousness among children.

During the interviews the children marked some advantages of the educational program, as a novelty of the course, application of received knowledge in the future etc., and moreover the true interest to the program was noticed during the lesson observation and interviews. Perhaps it confirms existence of the *commitment* and drive among children supported by the present educational program, and it is crucially important as "[…] knowledge about environmental problems cannot be transformed into action if courage and commitment are not present" (Jensen & Schnack, 1997: 482).

During the classroom learning process there was marked the involving the children in group discussion, presentation etc., what can promote the *one's own vision* of the problem, and that was mentioned as a one of the main components for action-oriented environmental education, as an important

requisite for the motivation and ability to act and change. But at the same time there were not practical exercises or situational tasks during the lesson or as a homework, which are important to comprehend the strategies for avoiding and reducing of excessive energy consumption or any other environmental problem and therefore there can be a problem to develop *the action skills* among children through this educational program.

In general the results, received through the analysis of the energy efficiency educational program, may be summarized in the following table:

Table 2. The conformity of the energy efficiency educational program with the action competence education

	Knowledge & insight	***Commitment***	***Vision***	***Action experience***
Action competence education	Yes	Yes	Yes	Yes
Energy efficiency educational program	**No**	Yes	Yes	**No**

6.4. Concluding remarks and possible ways for development

The present situation with the UNDP energy efficiency educational program may be stated neither bad nor good one, and there were defined several external and internal barriers which may block further development of the program. As was recognized the part of the problem connected directly with the educational program itself. And probably the present study may be used in the future for further research about the potential and ways for development and correction of energy efficiency educational program according to recognized deficiencies of the program itself and specific factors influence to the environment education in Russia. Here I would like to propose a few

recommendations to the program, according to the findings received during the present research.

First, it is necessary to mention the obligation to carry out the practical and situational exercises on energy saving both during the classroom study and at children's homes, which were proposed by the program authors and were highly recommended by researchers Jensen & Schnack (1997) for action-oriented education. The researcher of physically active education Margaret Whitehead states that "there is a coordination of senses and thought, and also a reciprocal influence between brain activity and material creative activity. In this reaction, the hands are peculiarly important. It is a moot point whether the human hand created the human brain, or the brain created the hand. Certainly, the connection is intimate and reciprocal" (Whitehead, 2007: 14).

Further the problem with a shortage of knowledge about the environmental problems connected with energy consumption and particularly about the environmental benefits due to energy saving is worthy of special attention. Perhaps, it is difficult to comprehend such issues through the energy saving program solely without the basic educational course on environment, which generally does not exist in the schools of Russia. One of the ways for avoiding the problem may be the edition of supplemental textbook to the main energy saving course, which will consist of more extensive information about environmental issues, about relationships between man and nature etc.

During the interviews the children showed a high interest to possible introduction of lessons and activities outside the school during the learning on the energy saving program. It may be excursion to a wind turbine or hike to the forest with some learning and active games etc. Today most children can identify more than a thousand corporate logos but can not name the plants or trees or birds in their own neighborhoods, or describe where their drinking water comes from, so it is significant to find ways to make the world a vibrant, interesting and meaningful place for children. It is crucially important for

development children's own views, values, experiences and "close observation – mixed with wonder – is essential for the development of artist, scientist, writer, as well as mathematician, humorist, inventor, and more". (Ruef, 2003)

For instance, the interesting approach, how develop the children experience with nature within the school, was proposed in the Centre for Ecoliteracy in Berkeley, California by the group of scientists (Stone & Barlow, 2005). They assumed that a "classroom", especially appropriated for children, is the school garden, which reconnects children to the fundamental of life, while integrating and enriching virtually every activity that take place at a school. When school gardens are made part of the curriculum, for example, children learn about food cycles, and they integrate the natural food cycles into theirs cycles of planting, growing, harvesting, composting, and recycling. Through this practice, children also learn that the garden as a whole is embedded in larger systems that are living networks within their own cycles. The food cycles intersect with these larger cycles – the water cycle, the cycle of the seasons, and so on – all of which are links in the planetary web of life.

Certainly environmental education sometimes fails to acknowledge the crucial role of emotions in the learning process, and activities that both inform the mind and engage the heart what is a powerful and effective combination, as people always protect what they love. And I prefer to finish the thesis with the expression of Scott Momaday which radiates understanding, respect, and affection for the nature:

> Once in his life a man… ought to give himself up to a particular landscape in his experience, to look at it from as many angels as he can, to wonder about it, to dwell upon it. He ought to imagine that he touches it with his hands at every season and listen to the sounds that are made upon it. He ought to imagine the creatures there and all the faintest motions of the wind. He ought to recollect the glare of noon and all the colours of the dawn and dusk. (Momaday, 1969, found in Stone & Barlow, 2005: 96)

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Appendix 1

Project participation form/Соглашение на участие в исследовании

"The forming of environmental behavior among children through ecological education in Russia: the case of UNDPs energy efficiency educational program"

The following information is provided for you to decide whether you wish to participate in the present study. You should be aware that you are free to decide not to participate or to withdraw at any time.
The purpose of this study is to understand and explain the effect of energy efficiency educational program (which was the part of UNDP/GEF project "Cost Effective Energy Efficiency Measures in Russian Educational Sector") on the forming of environmental behavior among children in Russia and what are the potentials embedded in environmental education. The project is the case study with mostly qualitative approach.
Data will be collected during December 2007 - January 2008, and will involve documents (UNDPs project documents, schoolchildren essays etc.), interviews, lessons' and families' observation fieldnotes, and audio-visual materials. Individuals involved in the data collection will be project responsible persons, schools' principals and teachers, schoolchildren and their families.

There are no known risks and/or discomforts associated with this study.

Please sign your consent with full knowledge of the nature and purpose of the procedure.

«Формирование экологического поведения среди детей через экологическое образование в России: на примере образовательной программы ПРООН «Энергосбережение»

Следующая информация предоставлена для Вас с целью принятия решения, хотите ли Вы учувствовать в данном исследовании. Вы можете быть уверены в том, что в любой момент можно отказаться от участия в проекте или не участвовать в нем вовсе.
Цель данного проекта в исследовании и понимании влияния образовательной программы по энергосбережению (которая являлась частью проекта ПРООН/ГЭФ «Экономически эффективные энергосберегающие мероприятия в российском образовательном секторе») на повседневное поведение детей и ее перспективы развития. В проекте используется методика исследования, основанная на изучении частного случая с помощью качественного анализа.
Данные для анализа будут собраны в течение декабря 2007 – января 2008 года, и будут получены документы (проектная документация, сочинения школьников и т.д.), проведены интервью и наблюдения в школах и семьях учеников, а так же собраны фото-видео материалы. В данное исследование будут вовлечены ответственные лица проекта ПРООН, директора и учителя школ, школьники и их семьи.
Данное исследование не содержит в себе никакого риска или неудобства для его участников.
Пожалуйста, подпишите данное соглашение в знак согласия и ознакомления с целью и задачами данного исследования.

_____ _____

Signature of Participant/ Подпись участника Date/Дата

Appendix 2

The survey of the project quantitative analysis

Region **School number**	**Does it still have energy efficiency educational program?**	**Comments (Why was it finished? etc.)**
Petrozavodsk region		
1. school #3	No	Sometimes children participate at the regional contests & exhibitions
2. school #7	No	No teacher
3. school #8	No information	
4. school #10	No	No teacher
5. school #11	No	No teacher
6. lyceum #13	Yes	The teacher of physics carries out the course
7. school 14	Yes	The teacher of physics carries out the course
8. gymnasium #17	No	Just a few elements in compulsory courses
9. school #19	No	
10. school #25	Yes	Optional course, exhibitions, contests
11. school #27	No	
12. gymnasium #30	No	No teacher
13. school #34	Yes	
14. school #35	No	No demand because of no funding
15.school #36	Yes	One hour per week
16. gymnasium #37	No information	
17. lyceum #1	No	
18.school #42	No information	
19. school #46	Yes	
20. Petrovskaya school	No	No demand because of no funding
21. Derzhavinskiy lyceum	No	Sometimes children participate at the regional contests & exhibitions
Arkhangelsk region		
22. school #1	No	Just a few elements in compulsory courses
23. school #2	No	Teacher can not teach this course because of a huge amount of other compulsory work.

24. school #4	Yes	
25. school #10	No information	
26. school #11	Yes	New teacher
27. school #14	No	No teacher
28. school #24	No	
29. school #25	No information	
30. school #26	No information	
31. school #28	No	No teacher
32. school #30	No information	
33. school #37	Yes	This course already submitted for next year
34. school #45	Yes	
35. school #49	No	
36. school #62	Yes	This course already submitted for next year
37. school #82	No	Children do not choose this subject as optional course, no interest
Murmansk region		
38. school #44	No	
39. gymnasium #1	No	No teacher
40. school #3	Yes	
41. school #23	No	
42. school #28	No	No demand because of no funding
43. gymnasium #1 (Severomorsk)	No information	
44. school #39	No	
45. school #31	No information	
46. school #266 (Snezhnogorsk)	No	No demand because of no funding
Tver region		
47. gymnasium #6	No	
48. school # 17	No	Only a few elements at the compulsory courses
49. school #14	No information	
50. Tverskoy lyceum	Yes	
51. school #46	No	No demand because of no funding
52. school #37	No information	
53. school #47	No	It was a part of the economic course
54. school #1 (Bologoe)	No	The school principal does not remember this program
55. school #10 (Bologoe)	No	Children do not choose this subject as optional course, no interest
56. school #11 (Bologoe)	No	New director has no idea about this program

57. school #12 (Bologoe)	No	No teacher
58. school #1 (Lihoslavl)	No information	
59. school #2 (Lihoslavl)	No information	
60. Vesninskaya school	No information	
61. Kalashnikovskaya school	No information	
62. gymnasium #44	No	No teacher

Appendix 3

Interview Protocol (for school principal & teachers)

Project: The forming of environmental behaviour among children through ecological education in Russia: the case of UNDPs energy efficiency educational program

Time of interview:
Date:
Place:
Interviewer:
Interviewee:
Position of interviewee:

(Briefly describe the project)

Questions:

1. Do you still have energy efficiency educational program in your school?

Yes □ No □

2. How long is this educational program implementing in your school?

3. How much hours per week does it take?

4. How many schoolchildren are involved in this program every year? What is average age?

5. What are advantages of this program?

6. What are disadvantages of this program?

7. What would you like to add or delete in this program?

8. Do schoolchildren gladly participate in this program from your point of view?

Yes □ No □

9. What attracts schoolchildren in this program in your opinion?

10. What pushes them away to participate in this program from your point of view?

11. Do you think this program is significant for environmental education of schoolchildren? Why?

Yes □ No □

12. Do you know any other schools in your region which are interested or already taking part in the implementation of this educational program?

13. How do you see the development of this program in your school and across the region?

(Thank individual for participating in this interview.)

Interview protocol (for schoolchildren)

Project: The forming of environmental behaviour among children through ecological education in Russia: the case of UNDPs energy efficiency educational program

Time of interview:
Date:
Place:
Interviewer:
Interviewee:
Position of interviewee:
Age and sex:

(Briefly describe the project)

Questions:

1. Have you participated in energy efficiency educational program at your school?

- Yes, I'm participating in it now □
- Yes, I've taken this program 1-2 years ago □
- No, I haven't taken this program because…… …… …….. □ (next questions 9-11)

2. On the whole do/did you enjoy this educational program? Why?

Yes □ No □

3. Why did you decide to participate in this class?

4. What do/did you like mostly in this program? (for example training materials, teacher, the significance of this program etc.)

5. What do/did you dislike in this program?

6. What was the most memorized lesson or moment during your study?

7. Does this program significant for children education from your point of view? Why?

Yes □ No □

8. What would you like to add or delete in this program?

9. What is energy efficiency? What energy efficiency measures do you know?

10. Do you carry out energy efficiency measures at your everyday life? If yes, give some examples of that.

Yes □ No □

11. Do you think it is significant to carry out energy efficiency measures at everyday life? Why?

Yes □ No □

(Thank individual for participating in this interview.)

Interview protocol (for schoolchildren's parents)

Project: The forming of environmental behaviour among children through ecological education in Russia: the case of UNDPs energy efficiency educational program

Time of interview:
Date:
Place:
Interviewer:
Interviewee:
Position of interviewee:

(Briefly describe the project)

Question:

1. Did you know that your child have participated in energy efficiency educational program at school?

   Yes □ No □

2. Are you supported his/her decision to take part in this program? Why?

   Yes □ No □

3. Did your child discuss with you his/her study on this program at home? If yes, what exactly did he/she tell you?

4. What is energy efficiency? What energy efficiency measures do you know?

5. Does this program significant for children's education from your point of view? Why?

Yes □ No □

6. Does your child carry out energy efficiency measures at his/her everyday life? If yes, give some examples of that.

Yes □ No □

7. Do you carry out energy efficiency measures at your every day life? If yes, give some examples of that.

Yes □ No □

8. Do you think it is significant to carry out energy efficiency measures at everyday life? Why?

Yes □ No □

(Thank individual for participating in this interview.)

Appendix 4

The summary of interviews with the program participated schoolchildren

Interview number & the group code; grade & gender	**Advantages; what do you like most of all**	**What to change or add to program**	**What is the purpose of energy saving**	**Known energy efficiency measures ; realization at home**	**Additional information & Comments**
PB1; 11th & F	Actuality/Importance, independent research; the teacher	Out-of-school lessons & activities	Economic development of the country	Shutoff the light, electric devices; NO	No comprehension of ecological purpose of energy saving
PB2; 11th & F	Novelty	Out-of-school lessons & activities	No answer	NO	High stress at school because of overladen schedule; overall lassitude
PB3; 11th & F	Novelty	Out-of-school lessons & activities	Saving money of the state	Shutoff the electric devices; NO	Going to implement energy efficiency measures for money saving; no comprehension of ecological purpose of energy saving
P1; 9th & M	Novelty, future application, friendly atmosphere during the lessons	Introduce as an obligatory course, out-of-school lessons & activities	Saving of our environment	Shutoff the light, electric devices, hot water economy; YES	Energy efficiency is the determinant factor of the country development
P2; 9th & M	Actuality/Importance, future application; course textbook	More lessons; out-of-school lessons & activities	Money saving	Energy efficiency lamps, energy consumption counter, windows repairing ; YES	No comprehension of ecological purpose of energy saving
P3; 9th & M	Novelty, actuality/importance;	More lessons; out-of-school lessons &	Nature resources saving	Shutoff the light, energy efficiency lamp, hot	Environment education is important for our future

	teacher	activities		water economy; YES	
P4; 9th & F	Novelty, friendly atmosphere during the lessons; the teacher	Out-of-school lessons & activities	Change of people lives	NO	No comprehension of ecological purpose of energy saving
P5; 9th & F	Novelty, friendly atmosphere during the lessons; the teacher	Out-of-school lessons & activities	Money saving	Shutoff the light, electric devices, energy efficiency lamps; YES	Environment education is important to save our nature
P6; 9th & F	Novelty, presentations	More environmental information and knowledge	No answer	NO	Afraid of tricky questions during the lessons
P7; 9th & F	Future application, independent research, friendly atmosphere during the lessons	Out-of-school lessons & activities	For well-being of yourself and the state	NO	No comprehension of ecological purpose of energy saving
P8; 9th & F	Novelty, actuality/importance, friendly atmosphere during the lessons	Out-of-school lessons & activities	Natural resources saving	Shutoff the light , energy efficiency lamps, windows repairing before a winter ; YES	Environment education is important for our future
P9; 9th & F	Future application, teacher	Out-of-school lessons & activities	No answer	Shutoff the light, windows repairing; YES	No comprehension of ecological purpose

The summary of interviews with the program non-participated schoolchildren

Interview code; grade & gender	**Why haven't participated at the course**	**What could attract to take this course**	**What is the purpose of energy saving**	**Known energy efficiency measures ; realization at home**	**Additional information & Comments**
NP1, 9th & F	No time, overladen school schedule	Out-of-school lessons & activities	Saving your money and budget of the state	Shutoff the light; NO	Shutoff the light at home as don't like the electric light
NP2, 9th & M	Didn't know about the existence of the course	Out-of-school lessons & activities	Saving money and the natural resources, ecosystems	Shutoff the light, electric devices. YES	Parents teach him to save energy; sufficient level of environmental knowledge.
NP3, 11th & M	Didn't know about the existence of the course, overladen school schedule	Out-of-school lessons & activities	Environment protection and resources saving	Shutoff the light; YES	Energy efficiency measures are important most of all for environment saving; he is going to be geographer in future
NP4, 9th & F	Didn't know about the existence of the course	Open discussions; out-of-school lessons & activities	Energy saving with the money saving purpose	Energy efficiency lamps, shutoff the light; YES	Environment education is important for our future; energy saving – money saving
NP5, 9th & F	Didn't know about the existence of the course (after the interview she began to take the course)	no answer	no answer	Less use of electric devices; NO	No comprehension of energy saving almost at all
NP6, 10th & F	Didn't know about the existence of the course	No answer	Natural resources saving, reduction of atmosphere pollution	Energy efficiency lamps; YES	Energy efficiency measures are crucial for environment saving; interest in geography
	Didn't know about	Out-of-school	Environment saving	Shutoff the light, hot	Energy efficiency measures

NP7, 9th & F	the existence of the course (after the interview she began to take the course)	lessons & activities	and finance economy	water economy; YES	lead to responsibility, money and resources saving. She is going to be the biologist in the future.
NP8, 10th & F	No time, overladen school schedule	No answer	No answer	Shutoff the light; YES	No comprehension of energy saving almost at all